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SEMANTIC AND SYNTACTIC GROWTH IN YOUNG CHILDREN

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Semantic and Syntactic Growth in Young Children submitted by Mary Mallet in partial fulfillment of the requirements for the degree of Master of Education

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ABSTRACT

The purpose of this study was to investigate the relationship between the semantic and syntactic growth in young children.

Thirty five-year-old boys and girls participated in the study. Each child was tested on measures designed to tap his receptive and expressive language abilities. Specifically, the instruments measured the children's recognition and recall vocabulary and their reliance on word order to comprehend and produce sentences. Furthermore, a sample of continuous discourse was elicited from each child.

Correlations among the syntactic and semantic test scores were drawn. The incidence of selected features in the sample were also correlated with the test scores. An additional measure taken of the child's syntactic development, as revealed in the language sample, the Developmental Sentence Score, was correlated with the test scores and incidence of syntactic features in the sample.

The results of the statistical analysis indicated a generally positive relationship between the children's understanding of word meaning and their ability to comprehend and produce sentences. It was found, however, that there were many more significant relationships between expressive language scores and other variables measured than between receptive language scores and other measures. The total words uttered in the language sample and the Developmental Sentence Score emerged as the best summary scores of the children's syntactic ability. In particular, the child's ability to define words was found to be significantly related to his syntactic control;

on the other hand, there was an equally insistent negative correlation between word recognition and syntactic control.

The results would suggest that semantic and syntactic growth are closely related and should be considered as such in any curriculum planning or instructional approaches in the Language Arts.

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Chapter I

THE PROBLEM

Introduction

It is convenient, if not entirely valid, to think of children's language development in terms of growth in four discrete areas: phonological, syntactic, semantic and pragmatic. Linguists and psychologists have tended until recently to perpetuate the notion that, for study purposes, language systems could be considered independent. Older Language Arts curricula also reflect this piecemeal approach; instruction was given separately in phonics, vocabulary and grammar.

More recently, however, researchers have claimed that language acquisition theories must integrate these mutually complementary systems, for within the individual language user, they are never operating independently (Bloom, 1970; Rommetveit, 1968).

The following exchange illustrates the interrelation between word meaning and syntax; the child understands the meaning of "glass" only when it is used as a noun:

Child: Is this a plastic bottle?

Mother: No, it's a glass bottle.

Child: No, it's not, Mom. It's not a glass. It's a bottle.

This child needs to learn all the possible meanings for the word "glass" and the different functions the word can, and cannot, assume in a sentence. To acquire a full syntactic-semantic mastery of his language, the user must understand and control word meanings, and

syntax and be able to grasp the intricate interdependence of these two systems.

Currently, Language Arts programs are becoming increasingly integrated. The receptive and expressive dimensions of oral and written language are considered supplementary components of the Language Arts (Language Arts Curriculum Guide, 1978). Research studies have strongly influenced the development of these programs; for example, the studies into the acquisition of syntax have suggested methods of teaching about grammar which emphasize the children's use, rather than an analysis of their language (Hennings, 1978).

However, despite the plethora of studies into language development in general, and numerous studies which are concerned exclusively with either vocabulary development or syntactic growth, relatively few investigations have focussed on the relationship between semantic and syntactic growth. Discovering how these systems develop and how closely development in each is related to the other may provide further direction into how children's early linguistic competence could be extended in the classroom.

Clarification of the Problem

Research has established that the pattern of development of these two systems is not simultaneous in young children. Mastery of the syntactic system is rapid, and almost complete, by the time the child enters school (Berko, 1958; Cazden, 1969); semantic growth is a much slower, lifelong project (McCawley, 1968).

Nor do the systems develop independently. Rommetveit (1968) suggests that in acquiring their language, children learn both referential and syntagmatic properties for words. Learning the meaning for any word involves grasping the connection between a particular phenomenon in experience (referent) and the sound or sight of a word which is used consistently by others in reference to that phenomenon. The word "apple" is always used to name that particular round, smooth, red, crisp fruit with seeds, which tastes sweet and juicy. At the same time, however, the child is learning how the word can be used in a sentence, how that particular word can be shown to relate to other words. He learns he can use the word in a sentence frame like "I like an _____" or "The _____ is good." He will also learn he can use the word in another way, e.g. "She baked an _____ pie." In learning to comprehend and produce sentences, the child must learn to relate the appropriate word to what he and his language community perceive or imagine (referential properties), and to grasp the ways, and the restraints on the word, as it may be used in a sentence (syntagmatic properties).

One aspect of the "syntagmatic property" of a word is the position of words in particular order within a sentence. The child can produce the sentence, "Ted drank the milk" and be understood. But the reverse of that word order, "The milk drank Ted" is anomolous, not meaningful. (The reason for this anomoly is governed by a particular property of "milk"; this noun is inanimate and thus cannot "drink.")

Some sentences in English may be "reversible"; the two sentences, each with a different word order, convey a different meaning. Thus, for example,

The dog chased the man.

The man chased the dog.

are both meaningful sentences.

Furthermore, within some English sentences, some words are "movable"; when their position is changed, the essential meaning of the sentence remains the same:

With her handkerchief, she waved good-bye.

She waved good-bye with her handkerchief.

In other instances, however, to move a part of the sentence is to alter the meaning:

The man with the ticket spoke to the child.

The man spoke to the child with the ticket.

How do children learn these syntactic rules? Do children with well developed vocabularies have greater mastery over the rules governing word order?

2. PURPOSE OF THE STUDY

The present study was an attempt to respond to Rommetveit's question (1968): "What is the relationship between the child's acquisition of word meanings and his ability to comprehend and produce sentences? In other words, what is the relationship between his syntactic and semantic growth?

In order to investigate the nature of that relationship, specific measures and procedures were selected, and others adapted, for use in this study. Word meaning scores were the subjects' results on the Peabody Picture Vocabulary Test (Dunn, 1959) and the weighted scores assigned to the children's definitions to the first fifty words on Form B of the same test. The dimension of syntactic growth studied was the children's control of word order. This was measured by the word order production and comprehension tests, designed for the present research. The language samples were analyzed according to five variables proposed by Loban (1963). Finally, the samples were also analyzed for Developmental Sentence Scores (Lee and Canter, 1974). It was felt that an analysis of these data, and a view of the correlations among these variables might provide some answers to Rommetveit's question.

If syntactic and semantic abilities are highly correlated, it may suggest that instruction in the two curriculum areas of vocabulary development and "sentence structure" be even more closely, and explicitly, linked.

3. RESEARCH QUESTIONS

1. What general relationship, if any, exists between the child's comprehension and production scores on the word order and the word meaning tests?
2. What relationships, if any, exist between the word meaning test scores and the incidence of selected features and Developmental Sentence Score of the language sample?

3. What relationships, if any, exist between the word order test scores and the incidence of selected features and the Developmental Sentence Score of the language sample?

4. DEFINITIONS

For the purpose of this study the following definitions will be used.

Word meaning recognition score--the raw score on the Peabody Picture Vocabulary Test.

Word meaning definition score--the weighted score given to the child's definitions of the first fifty words on the Peabody Picture Vocabulary Test.

Total word meaning score--a composite of the Word Meaning Recognition score and the Word Meaning Definition score.

Word order comprehension score--the raw score obtained on the Word Order Comprehension test (developed for the present study).

Word order production score--the raw score obtained on the Word Order Production test (developed for the present study).

Total word order score--a composite of the Word Order Comprehension and Production scores.

Total word count--the total number of words elicted from the child in the sampling situation.

Communication unit--a single independent clause with related dependent clauses (Loban, 1963).

Mean length of utterance--the mean length of the child's communication units.

Subordination index--a weighted score to measure the child's use of complex and compound-complex sentences (Loban, 1963).

Type-token ratio--a vocabulary measure devised by relating the total number of words the child used to the number of different words he used in a sample.

Developmental Sentence Score--a clinical measure of syntactic growth developed by Lee and Canter (1974).

5. DESIGN OF THE STUDY

Thirty five-year-old children were tested for their ability to recognize and define words and their control of word order in tasks involving comprehension and production of simple sentences. Samples of the children's continuous discourse were elicited using four different stimuli. Test scores were tabulated and the language samples were analyzed. Results of the analysis were examined statistically.

6. LIMITATIONS

The study is limited in the following ways:

1. The instruments used, the word order and word meaning tests are not exhaustive in their assessment of syntactic and semantic growth.
2. The use of pictures as a stimulus in the word meaning recognition and the word order tests may be inadequate.

3. The language produced in the testing or sampling situations may not be an adequate reflection of the child's overall language ability.

7. SIGNIFICANCE OF THE STUDY

This study of the relationship between children's semantic and syntactic growth was undertaken primarily to increase understanding of this aspect of language development. The results may suggest some useful directions for teachers to take to encourage expansion of vocabulary and the development of a clear and flexible sense of language structure in elementary school children.

8. PLAN OF THE THESIS

In Chapter I, the problem has been presented and the nature of the study described. Chapter II includes a review of the literature, outlining both the theories of semantic and syntactic development and the types of research which have been undertaken. More specifically, the results of studies which pertain to the present problem are reviewed. The sample, instruments and procedures used, the scoring techniques and statistical procedures are all outlined in Chapter III. The results of the statistical analyses and a discussion of those results are included in Chapter IV. Chapter V contains the findings, a discussion of the results, and the implications of the study.

Chapter II

REVIEW OF THE LITERATURE

The literature concerned with language development in normal young children falls roughly into two sections: broad descriptive studies of child language at various ages, among different populations; and more narrowly focussed investigations into particular features of language, such as syntax acquisition or depth of vocabulary.

The first part of the present review will include those studies which were meant, primarily, to provide accounts of language growth in an individual child, or among many children. Although a variety of methods has been employed by different investigators, and the focus of the studies may be somewhat different, all of these studies include global descriptions of language development.

The second and third parts of this chapter will review other studies which focus more closely on syntactic or semantic development. In each of these studies the author considered separately a particular system of language development. It is also characteristic of these studies that the author was concerned with explanation, as well as descriptive data, and included in his paper a discussion of his findings in the light of a particular language acquisition theory.

Section four will present the more recent studies which have viewed both syntactic and semantic development as part of the child's general cognitive and social growth. These authors, too, are

concerned as much with explanations of language acquisition, particularly of early one and two word utterances, as with normative data.

The major conclusions of the studies presented will be summarized at the end of the chapter.

1. GENERAL LANGUAGE STUDIES

Early Surveys

The huge library of studies into child language has been regularly catalogued and summarized; the first review of literature in the field appeared in 1833. More recently, useful accounts and interpretations of research findings have been made by McCarthy (1954), Carroll (1960) and McNeill (1970). Annotated bibliographies have been compiled by Leopold (1952), Slobin (1972) and Abrahamsen (1977). Slobin's revision of Leopold's early bibliography contains over 1600 entries; fewer than half of these were included in the original index.

McCarthy's survey of the literature prior to 1954 includes reviews of the early studies into childhood language. These she groups into two distinct types. The first investigations made in this century were bibliographical case studies which focussed generally on phonetics and vocabulary acquisition. Large language samples were taken in long hand from a single child, or from a few children, often the researcher's own offspring (Piaget, 1926; Stern, 1907; Leopold, 1939). The purpose of these studies was to provide a detailed record of the development of sounds, words and early sentences in a particular child. This careful observation, recording

and descriptive analysis of one child's language performance over time is an approach still used (Brown, 1973; Bloom, 1970; Bowerman, 1973) and, according to McNeill (1970), yields the richest data about language acquisition.

Other investigators took a more broadly based approach; they gathered much smaller samples from greater numbers of children for quantitative analysis. Nice (1925), investigating the language of a large number of children, considered the development of grammatical complexity and suggested length of sentence as a criterion of progress in speech. He found that, typically, sentences expanded as the child grew in age and noted a similarity in the pattern of progression, despite marked differences in development. Smith (1926), sampling the language of nearly 300 preschool children, developed a standardized vocabulary test. In another part of her study, she analyzed the sentence structure of 1-hour recordings of 88 children's language in free play situations. Smith found that, generally, vocabulary and complexity of sentence structure increased with age.

In a 1927 study, de Laguna emphasized the important influence of social and behavioral factors on language development. More specifically, she observed that children's first words are characteristically closely tied to overt action, and the linguistic environment. McCarthy's own analysis in 1930 of fifty consecutive verbal responses of 140 children included length of response, complexity of sentence structure, function of response and a tabulation of the various parts of speech. She found that length of

response and complexity increased with age; that, as children matured, the proportions of the various parts of speech in their language became increasingly closer to the proportions found in adult speech. Buhler (1934) also investigated the functions or purposes evident in children's speech and identified three basic purposes of their language: expression, representation and appeal. In the same year, Fisher explored the relations between the language patterns of pre-school children and age, sex and non-verbal intelligence. She was, furthermore, interested in what children talked about. Fisher found that linguistic ability and non-verbal intelligence were highly correlated and that with age, non-verbal speech and repetitions decreased, and that the number of complete sentences increased; all types of sentences were evident in the language of four year olds. Fisher also found that a high percentage of the children's remarks were about themselves; a finding which appeared to support Piaget's notion about the ego centricity of the young language user (1926). She also found, however, that girls more often than boys tended to speak more often of others, to give more commands and to ask more questions. Davis (1937) compared the language of twins, siblings and only children; the study is of interest as much for her methodology as for her results. During the course of her study, she developed a means of determining the parameters of typically indistinct "sentences" of young children. Her idea of "expression units" would be used and refined by later researchers (Loban, 1963; Strickland, 1962; Templin, 1957). In another analysis of a large number of language samples, Williams

(1937) attempted to quantify the complexities of sentence structure by assigning arbitrary scores to certain types of structures, considered to be more or less complex. This approach, also, would be elaborated by later investigators (Strickland, 1962; Loban, 1963; Templin, 1957).

The era of ambitious collections of data for cross sectional analysis of children's language seems to have waned by 1940. Much of the data gathered by then was used in the compilation of norms of child language development (e.g. Gesell et al., 1940). Their charts described measures of development and normative behavior at each age from one to five. From 1940, with the availability of the tape recorder, interest turned more specifically to the area of phonetics and to investigations of particular language difficulties.

McCarthy comments that the early field studies are characterized by rather global statements about the nature of language; however, many of the persistent concerns of more recent scholars were also on the minds of their predecessors. The studies cited above, and others like them, involved all aspects of language development: the syntactic, phonological, semantic and pragmatic. Reflections on the nature of the child's "first words" have been, and continue to be, particularly compelling. Means of assessing the increasing complexity of the child's grammar, charting development of maturing articulation, and ways of measuring vocabulary development are tenacious problems. The early investigations of the child's language, his behavior and his social environment (Buhler, 1934; Fisher, 1934; Piaget, 1926) have been pursued vigorously by Brown,

(1973), Bloom (1970), and Bates (1978) in the 1970's. The root system of the current research is clearly evident in any historical review of the field.

More Recent Surveys and Tests

After a twenty year hiatus, researchers began again the methodical accumulation of general descriptive data begun by the investigators of the 20's and 30's.

Templin (1957) studied the interrelationships among language skills in 480 children, aged 3-8. She considered vocabulary, sentence structure, length of sentence and articulation of speech sounds. She also conducted a longitudinal study of articulation following the same children from 2½ to 6 years. Her study provides normative data over the age range she investigated and her findings support the contention that language skills are highly correlated.

Strickland (1962) studied the oral language of nearly 600 school children; in the course of her investigation she devised a method of segmenting utterances into phonological units for analysis. Her analysis, itself, was concerned with the frequency of occurrence of certain kinds of syntactic patterns, the amount and kinds of subordination and the average length of utterances. Her study also involved a tabulation of the children's non-structural elements within their sentences, and their use of movables, those elements, mainly adverbial, which may assume a variety of positions within the sentence. Strickland was also interested in the grammatical structures used in early readers and how well it reflected the

children's own use of grammar. She found that even grade one children used all the sentence patterns of adult language but that such a variety of structures was lacking in the early readers. She also found that as children matured, they tended to use subordination more often and more efficiently and that the number of "movables" in their speech increased.

In 1963, Loban published the results of his longitudinal study of over 300 school children, which he had initiated in 1952. Besides providing a comprehensive description of children's language development, Loban wanted to perfect some fundamental methods to aid in the scientific study of early language. He proposed that the language samples be broken down into "communication units" which he defined as "a main clause plus any subordinate clause attached to it." To measure complexity, Loban refined earlier techniques into a "subordination index" which allowed various weightings for simple, compound and embedded sentences. Of particular interest in Loban's analysis was his designation of mazes (Strickland's "garbled" speech) and "movables," also taken from Strickland's study.

Loban noted that over the years, children's utterances became longer with fewer false starts and mazes. He observed, however, that the mark of the efficient language user was not the length of his sentences but the ways in which he had "made his sentences long." The child with good control of his language was parsimonious and flexible, rather than simply more complex. He had, in particular, control over the word (and phrase) order within his sentences. Later, Hunt (1964) and O'Donnell et al. (1967) applied similar

methods to analyze large samples of children's oral and written language. Hunt devised the T-unit, similar to Loban's "communication unit," and found that increased T-unit length was the most reliable index of syntactic maturity. O'Donnell found that T-units were shorter in writing than in speech at the grade 3 level, but longer in writing among children in grade 5 and 7. Fox (1972) in a replication of part of the O'Donnell et al. study with kindergarten and grade one children used both syntactic and vocabulary measures to chart normal language development. She found the mean number of words in a unit to be a "robust tool" to assess language development.

The use of such a measure of language maturity, mean length of utterance, has had steady support from a variety of researchers. Somewhat different definitions of what constitutes a child's "utterance" have been proposed; however, the MLU has become an almost standard index of grammatical growth (McCarthy, 1954; Strickland, 1962; Loban, 1963; Brown, 1973).

Although Loban used a transformational grammar to analyze a small number of his children's samples, the major analytical techniques in these large studies were based upon structural grammar (Fries, 1952). Paula Menyuk, however, in a series of language studies, used transformational grammar to describe the language of children from nursery school through grade three (1962, 1963, 1964, 1970). Her most significant findings were that all adult structures were found in the language of young children. Their grammar is continuously maturing in a fluctuating, uneven progression; grade

one children used significantly more transformations than kindergarten children did. Brown (1969) used a transformational-grammar analysis of the language of children from different ethnolinguistic communities. He noted differences among the different speakers and as Menyuk had found, a definite, but variable progression in development. He postulated that the identification of the frequency and complexity of the transformations employed in producing a sentence might provide a scale for measuring linguistic maturity.

Scales of Syntactic Development

Leopold (1954) had spoken of children's growth of grammatical maturity as a "refinement of coarse patterns." In their paper, outlining the processes the child uses to learn his grammar, Brown and Bellugi (1964) state that as the child induces more and more of the latent structure of his language, one sees a progressive differentiation of syntactic classes. Learning grammar, however, also involves integrative processes as children learn to embed phrases and clauses in larger units. Thus, the child is able to use an increasing number of optional transformations to control his expression and facilitate his comprehension.

Brown and Hanlon (1968) reported findings to support their hypothesis that constructions would emerge generally in the order of increasing derivational complexity. Complexity was measured by the number of optional transformation rules used in composing the sentence. This "law of cumulative complexity" seems to account for the emergence of some structures, but not all. Slobin (1966), for

example, was puzzled when the children in his study took more time to comprehend simple negative sentences than relatively more complex passives; he concluded that semantic and psychological--as well as syntactic--factors are required to explain this finding. Gaer (1969), who found children could comprehend simple sentences much more easily than centre embedded and double embedded sentences, concluded from his findings that there is evidence that syntactic and psychological complexity are related, although the relationship may not be a simple one.

Clinicians, concerned with instruction and remediation of language skills, are particularly interested in the establishment of scales of language growth, which the preceding studies suggest. The Developmental Sentence Score (Lee and Canter, 1974) is one scale which uses the findings from recent psycholinguistic studies, but traditional terminology. The scale of syntax acquisition, showing the general order in which normal children achieve particular structures was devised from earlier studies of the emergence of specific grammatical features. The testing procedure was also borrowed from the psycholinguists' methodology. Rather than scoring the child's response to test items, the particular features of a spontaneous sample of his speech are tallied and weighted. The scores are based upon the assumed complexity of the various features. Thus, it is possible, claim the authors, to measure the child's grammar against adult Standard English. The Developmental Sentence Scale was published as a clinical procedure for analyzing verbal responses and planning appropriate remedial procedures.

Other clinical measures, designed primarily for speech clinicians as screening devices, test receptive and expressive use of syntactic forms. Such tests as the Northwestern Syntax Screening Test (1969) are closely patterned after the stimulus-response studies made by Brown (1957) and Fraser and Bellugi (1963). Another instrument, developed by Italian researchers, to test verbal comprehension in children and aphasics, was similarly based on the Fraser study (Pizzamiglio et al., 1968). Other measures, like the Illinois Test of Psycholinguistic Abilities (1968) test a wider range of language skills.

Psycholinguists are quick to point out the inadequacy of standardized tests as profound measures of language ability; McNeill (1970a) cautions against their lack of subtlety and sensitivity; nonetheless, for the clinician, concerned with practical therapy rather than linguistic theory, the tests undoubtedly serve a function.

Summary

This section of the literature review has surveyed some of the important general studies in language growth. The major finding of these studies characteristically was a steady, if uneven progression in children's language development. Although individual growth may vary markedly, there appears to be a fairly regular and consistent pattern of the emergence of particular language features. This development appears in most studies to be a progression towards increased syntactic complexity, and flexibility in the use of

language. Furthermore, normal speaking children are using all types of English sentence patterns by the time they enter school. Development during the school years is mainly experimentation with, and elaboration of, structures they have already acquired.

Finally, a review of the attempts to provide standardized tests for syntactic maturity has been presented.

2. STUDIES OF SYNTACTIC GROWTH

In 1957, Noam Chomsky posed a question which profoundly influenced the direction of subsequent language studies. Rather than asking what? is learned when?, he wanted to know how? How, in such a short time, without formal instruction, does any child acquire the knowledge and use of the particularly complex human language system?

The Influence of Noam Chomsky

Chomsky's studies and reflections led him to believe that the only plausible explanation for such rapid and facile learning could be some sort of innate structure which allowed the child to acquire a rule system, enabling him to create, not merely imitate, an infinite number of sentences, most of which he had never heard before. This innate structure, which Chomsky labelled a Language Acquisition Device (LAD) constructs for the child a theory of the regularities which underlie the speech to which he has been exposed. This theory is the child's grammar. McNeill (1970b) explains that the LAD itself is an hypothesis about children, everywhere, learning language;

we observe them learning language as if they did, indeed, have such a built-in device. Chomsky and his colleagues distinguish between the underlying "deep structure" of all human language--and the surface structure of specific speech acts. "Just as we induce a 3-D space underlying the two-dimensional pattern on the retina, so we must induce a syntactic structure underlying the linear strings in a sentence" (Miller, 1962, 18).

Linguists, like Chomsky, are concerned with the nature of language itself; they attempt to describe all the generalizations about the language that the native speaker has knowledge of (Menyuk, 1969). Unlike the psychologist, the linguist is not as concerned with the ways in which the human organism acquires and uses this competence or knowledge. In other words, the linguist studies language; the psychologist, the language-user. Nonetheless, the power of Chomsky's model of transformational grammar had a profound influence on the psychologists interested in language acquisition. The associative, stimulus-response theories of Mowrer (1960), Skinner (1957) and Staats (1968) seemed woefully inadequate to explain the generative power of even the youngest child's language. "It is the phenomenon of abstraction which eliminates stimulus-response theory as a possible explanation of language acquisition. The most abstract part of the language--its propositional content--is the first to develop" (McNeill, 1970b, p. 1087). For Chomsky, syntax, which explains the linguistic relationship between sound and meaning, is the heart of language. Semantics, the theory of meaning itself, had no place in his first theoretical

papers (although semantics does figure more prominently in his 1965 publication, Aspects of the Theory of Syntax).

The publication of Chomsky's Syntactic Structures in 1957 prompted a flood of psycholinguistic interest in language acquisition. The focus of the subsequent investigations during the 1960's shifted decidedly from wholistic surveys of general language development to an energetic scrutiny and contemplation of children's grammar. Fortunately, bibliographers (McNeill, 1970b; Carroll, 1966; Abrahamsen, 1977; Slobin, 1970) have provided indices and commentaries on the plethora of these naturalistic and clinical studies.

Studies Using the Transformational Grammar

Brown recalls responding to Chomsky's first papers with the idea that "a transformational grammar is what children learn when they learn their first language" (1970, 17). Working with this hypothesis for the following twenty years, Brown, with numerous colleagues, succeeded in writing grammars for children at five stages of language growth (1973). Other investigators (Braine, 1963; Brown and Bellugi, 1964; Miller and Ervin, 1964; Weir, 1962; McNeill, 1966b; Menyuk, 1963, 1964; Bloom, 1968) have also used this approach which involves, first, the collection of a sizable corpus of spontaneous utterances and running notes on the situation in which the language was produced. The analysis of the resulting corpus is distributional; that is "the words are grouped into classes which are defined by the fact that the members of a class have the same privilege of occurrence" (McNeill, 1970a; Brown

and Fraser, 1963). These word classes are identified, not in terms of meaning, but rather in terms of substitution within a linguistic context; e.g. the morphemes that fit in the sentence frame: "That _____ was silly" constitute a class (Ervin and Miller, 1963). These regularities among word categories are used as a basis for developing child grammars; the purpose of these grammars is to predict, theoretically, the sentences that the child could possibly make (Brown and Fraser, 1963). However, the child's grammar is continuously developing and grammars may be written for any stage of development (Brown, 1973). These are, of course, inferred grammars; on the basis of careful observation and analysis of the child's actual utterances, the researcher assumes the child has developed a particular grammar, an underlying knowledge about his language, which enables him to speak as he does.

The emergence of a fairly regular but uneven pattern of language development was the major finding of this particular line of research. These studies also showed that it was possible to describe child grammar without relying solely on the terminology of adult grammar. The work of Martin Braine and Roger Brown, who defined categories peculiar to child grammar, will be reviewed later in this section.

Numerous authors have undertaken the study of the emergence in children's language of particular grammatical features. These studies, rather than building child grammars, are based on an adult grammar and attempt to describe the sequence in which the child develops aspects of that grammar (McNeill, 1970). In an early

study of this type, Berko (1958) used pictures to stimulate children's responses to nonsense words and drawings when she investigated the children's control of morphological endings. Brown (1957) used a similar technique to explore children's understanding of mass and count nouns and action words. Klima and Bellugi (1966) considered the development of questions in children's language; Ervin and Miller (1964) plurals; Bellugi (1964) negation; Slobin (1963, 1966) and Brown (1968), the active and passive voice. In an interesting series of studies, the de Villiers (1972, 1973a, 1973b) used puppets to create situations which allowed them to study children's control of word order, inflectional morphemes and awareness of grammaticalness. It is beyond the scope of this survey of the literature to report the findings of all these studies. In summary, it may be noted that these researchers found that children's control of all the structures studied increased with age; that there was a general pattern of the emergence of these features among children and that most of these structures are efficiently controlled by the time the child enters school.

Of particular interest to the present study was the study made by Fraser, Bellugi and Brown in 1963. They used pairs of pictures representing grammatical contrasts to study children's comprehension and production of certain grammatical features. They hypothesized that certain features of an utterance are ordinarily understood before the same features are produced. The sample used was 12 children, 37-43 months in age. The children were given three tests of ten different grammatical contrasts (created by the use of

two utterances which are identical but for some grammatical feature). The contrasts tested included: mass/count nouns; singular/plural inflections; singular/plural verbs (is, are); present progressive/past tense; present progressive/future tense; affirmative/negative; singular/plural, third person pronoun; subject/object, active voice; subject/object, passive voice; direct/indirect object. In the comprehension (C) test the child was presented with two line drawings with two accompanying spoken sentences. The child was then asked to point to the picture which illustrated one of the sentences which was repeated. The imitation (I) test involved no pictures; the child was simply asked to repeat two sentences. In the production (P) test, the child was shown two pictures with two corresponding sentences spoken by the examiner. The examiner then pointed to one picture and asked the child to give the corresponding sentence. In presenting their results, the authors noted that, for all children, comprehension scores exceeded production scores and that for nine children (N=12), imitation scores exceeded comprehension scores. Fraser et al. felt their results supported the ideas that imitation was basically a perceptual-motor skill, but comprehension depends upon control of reference, and production requires both reference and the organization of speech (more demanding than mere imitation). They concluded that the difficulty of language production was a function of "increasing the number of psychological operations in near simultaneity" (1963, 133).

The Fraser study also indicated the graduated difficulty of various grammatical features in the age range studied. The special

significance of their study, however, was in the consideration of the imitative, receptive and expressive abilities of their subjects.

Studies into Word Order

Another research approach to the child's developing syntactic control was a consideration of his early utterances or "sentences." Of particular interest were the ways he ordered his first words to represent a complete thought (naming and predication) in language. The word order of the early utterances is remarkably consistent with adult word order (McNeill, 1970a); the child's understanding of word order is obviously an important dimension of his syntactic knowledge. The following comments and reviews pertain to investigations of this understanding in young children.

The basic unit for any grammatical analysis of a corpus or of responses to a test situation is the morpheme--the smallest element in speech to which meaning can be attached. Morphemes may be divided into classes which share the same "privilege of occurrence," that is, serve the same function within the sentence. Furthermore, morphemes or words may be categorized as lexical, which make reference to some non-linguistic reality (e.g. house, barks, lovely, slowly) and functional, words or morphemes which serve primarily to indicate the relationships among the words within the sentence (e.g. because, for, and, except) and inflectional endings like "ing" and "ly." The sentence itself is not composed simply of a string of morphemes; rather the syntactic structure of the sentence imposes groupings that govern the interactions between the meanings of words in that sentence (Miller,

1965). The syntactic system itself, as well as the referential system of language, carries meaning by indicating the relations of one word to another within a sentence; for example, in the sentence "The children were playing in the garden," syntactic rules governing the order of lexical morphemes and the use of functional morphemes allow the speaker and listener to symbolize accurately the intended relationship between the children, their playing and the garden.

Leopold (1953) suggested that children learn the rules governing word order before they grasp control of functional morphemes. McNeill concurs: "Most children first adopt the hypothesis that abstract grammatical relations are expressed in language through word order" (1970a, 67). Ervin and Miller (1963), Brown (1973) and McNeill (1970a) observe that children's early sentences are in fairly regular order, and postulate a syntactic basis for this ordering.

A number of studies have focussed on the child's control of word order. They may be grouped into explorations of the children's early two and three word utterances, and clinical observations of children's ability to comprehend and express the active and passive voice.

Studies into Two and Three Word Utterances

During the 1960's two notions about children's early speech were presented which generated a decade of discussion before they were finally discredited. These were Martin Braine's idea (1963)

about "pivot" and "open" classes of words, and Brown's hunch about the "telegraphic" nature of speech (Brown and Fraser, 1963).

Braine attempted to interpret the structural characteristics of first word combinations uttered by 3 children, beginning at 18 months. He proposed that these words could be classified as either "pivot" which were few in number and occurred in a variety of particular positions in the child's utterance, and "open" which were numerous but occurred in relatively few positions. Possible "sentence" combinations observed were: P (pivot), X (open); XP_2 and XX. (The combination PP did not occur.) Braine suggested that children learn the position of pivots and choose complementary words determined by the social and physical stimuli that elicited the utterance.

Similar observations of word classes were made by Ervin and Miller (1963) who spoke of "operators" and "non-operators" instead of "pivot" and "open."

Brown and Fraser (1963), using a similar distributional analysis of a corpus, concluded that in their early short utterances, children tended to retain the reference (or lexical) morphemes, which receive more stress in pronunciation, and drop the functional morphemes. Often this telegraphic speech involved the loss of semantic distinctions (e.g. I see the man--See man) but it was probably necessary because of the limitations on the young child's immediate memory span.

Braine (1963) also investigated children's learning about word order by observing how easily ten year old children could learn a simple artificial language composed of nonsense syllables. The children were fairly successful in their efforts (could generalize to 75% of the items on a post test) and Braine hypothesized that what the children had learned was the locations of expressions in the utterances. They had, he reasoned, learned this word order by a process of "contextual generalization"--"A subject who has experienced sentences in which a segment occurs in a certain position and context later tends to place this segment in the same position in other contexts" (1963, 323). Braine felt the idea of contextual generalization was valid for children learning the word order of simple, declarative, non-reversible kernel sentences.

Bever et al. (1965) regard Braine's theory of contextual generalization as limited, and his methodology, engaging children in learning an artificial language, as invalid. They agree wholeheartedly with McNeill's comment:

> The difficulty with this theory (i.e. Braine's) is that the order and arrangement of the words in the surface structure of sentences is not necessarily the same as the arrangement in the underlying structure. It is the underlying structure which contains information represented as a phrase structure grammar, but it is the surface structure only that is available for positional learning. (1970a, 68)

Bever et al. suggest that findings from learning an artificial language may be useful to program language, but not to explain the

acquisition of a first language. Braine chose to agree with this position and cautioned psychologists that they "seriously question the adequacy of any theory of learning that does not account for the fact that underlying grammatical structures are, in fact, acquired" (1965, 492).

Studies into the Acquisition of the Passive Voice

The passive voice can be used to produce a sentence identical in meaning to another sentence but quite different in structure. For example, the surface structures of "The dog bit the man" and "The man was bit by the dog" are entirely different, but the underlying meaning of the two sentences is the same. Investigations into children's ability to comprehend and produce sentences in the active and passive voice would seem to be a fruitful approach to the child's control of "underlying" word order. Slobin (1963) had children (5-11 years old) judge the truthfulness of statements (active and passive, reversible and non-reversible) which matched different pictures. He found the children's judgments less accurate with the passive than active sentences. Non-reversible actives and passives were judged more easily. In a later study (1966) of children's and adults' ability to comprehend and produce kernel, passive, and passive negative sentences, Slobin found that passives took more time to comprehend than kernels and passive negatives took longer than negatives. Furthermore, he found that non-reversibility facilitated the comprehension of passive sentences in that, although the word order was reversed, it was still clear which noun was the subject and which the object. Turner and Rommetveit (1967), in a

similar study, found that the effect of voice was stronger than reversibility. They found the order of comprehension difficulty to be non-reversible active, reversible active, non-reversible passive, reversible passive. The authors also raised the question of some sentences being more reversible than others--e.g. "the cat chased the bird" is a much more likely phenomenon than "the bird chased the cat."

Bever, Mehler, Valian (1967) hypothesized that children will interpret a sentence $N_1 + V + N_2$ as actor + action + recipient; "the cat is being chased by the dog"--"cat chase dog." If that seems implausible, they will assume: recipient + action + actor: i.e. "dog chases cat." Commenting on the Bever et al. study, McNeill notes that by age four, "some strategy protects the child from reversing the subject and object in non-reversible situations and thus they could interpret "The pony is ridden by the girl" correctly, if not easily. Younger children without this strategy, which is presumably a semantic strategy, treat reversible and non reversibles alike" (1970b, 1126).

Summary

This section of the review has dealt with those studies involved with children's syntactic growth. Studies which developed child grammars and traced the emergence of particular grammatical features were reviewed. Investigations into children's acquisition of rules governing word order were also summarized. The most compelling finding of these studies is the rapidity with which children

learn the syntax and morphology of their language; by kindergarten, normal children "know" the syntax and the functions of their language: they know how to use it (Halliday, 1969).

3. RESEARCH INTO SEMANTICS

McNeill (1970b) characterizes semantics as the "most pervasive, least understood" aspect of human language. There is a wealth of data available about children's vocabulary growth, but little theory to tie it all together. McCawley (1968), reflecting on the Katz and Fodor (1963) definition of semantics as "linguistic description minus grammar," comments that semantics is really "a hairy mess that remains to be talked about after one has finished with linguistics" (p. 125). Any review of the literature would support McCawley's contention. With meticulous care, it would be possible to account for the rules governing the phonological and syntactical systems of a language. However, commenting upon the search for similar "rules" of semantics, McNeill explains:

> There is nothing in the superficial form of sentences even hinting at the underlying semantic regularities. Unlike syntactic abstractions which are systematically related to surface structures by means of transformations, the semantic relations between surface and deep structure are unsystematic. (1970b, 1123)

Thus, semantic development is markedly slower and more complex than syntactic development. The child quickly develops a linguistic theory of syntax but as Katz and Fodor (1963, 173) explain, "a

complete semantic which takes setting [i.e. reference] into account is impossible" and his semantic growth is much slower.

Theoretical Papers

Anglin (1970) summarizes three recurring aspects of any semantic theory:

1. Words are concepts; they are generic in that they denote not one but a group of referents. Vygotsky (1962) with poetic if not scientific insight described a word without thought as a "dead thing," and a thought unarticulated, "a shadow."

2. Words cohere in a hierarchial system; it is possible to "organize" concepts hierarchically in terms of superordinate and subordinate classes.

3. Word meaning, in part, may be inferred from a sentence. Word meanings are not isolated; and the meaning of a word may depend upon the linguistic context in which it appears. Thus, the meaning of s-e-a-l varies from "Seal the letter" to "The seal is on the ice." In other instances, however, unambiguous meaning can be established only by reference to the human environment in which the sentence is true. For example, there is no way to disambiguate the meaning of "Flying airplanes can be dangerous" without reference to the context in which the sentence is expressed. Rommetveit (1968) suggests that in learning words, children learn both the referential and syntagmatic features of a word; we learn the meaning of a certain word, and the rules governing its use in a sentence.

One important attempt to outline a theory of semantics was made by Katz and Fodor (1963). Beginning with Chomsky's question of how we learn to project from a finite number of sentences we hear to an infinite number we are able to produce, they proposed that grammar partially solves that problem. However, a grammar can provide identical descriptions for sentences that are different in meaning and different descriptions for sentences which are identical in meaning, e.g. The dog bit the man/The cat bit the woman and The dog bit the man/The man was bit by the dog. Asserting that no psychological theory can adequately account for the way we derive meaning from our environment, the authors reason then that we can account only for meaning which depends upon our knowledge of grammar and of semantics. Semantic theory, however, <u>can</u> account for ambiguities in a sentence, the number of possible readings (e.g. "The bill is large" has 2 possible readings) a sentence has, semantically anomolous sentences (e.g. "The paint is silent") and our ability to paraphrase a sentence (e.g. active and passive voice). Katz and Fodor theorize that each speaker of a language compiles a dictionary of every item in his lexicon. The entries for each item include grammatical markers which indicate how the word may be used in a sentence, semantic markers which reflect whatever relationships exist between that item and the rest of the vocabulary of the language. Then distinguishers are assigned to each item, which are intended to mark what is idiosyncratic about its meaning. The use of this "dictionary" by the individual speaker is governed by what Katz and Fodor regard as projection or "usage" rules, which govern

the ways a word can be used in a sentence.

Bolinger (1965) criticizes Katz and Fodor's model, maintaining it accurately describes a programmed language, but not a natural language. He rejects their theory on grounds which Katz and Fodor readily accede, that it is incomplete in that it cannot account for the derivation of meaning in sentences which require "knowledge" of the world to disambiguate (e.g. Visiting relatives can be boring). Nonetheless, Katz and Fodor's paper is useful in that they outline certain features towards a semantic theory. McNeill (1970), Rommetveit (1968), Nelson (1974) all make reference to similar ideas of lexical items marked by both referential and syntagmatic features. More recent writers, like Olsen (1977), however, attempt to develop a theory of semantics which shows that semantic decisions such as word choice are not determined solely by semantic or syntactic selection, but are made to differentiate an intended referent from some perceived, or inferred, set of alternatives. Thus, meaning is derived from the context in which words are spoken, as well as from the words themselves or from any relations among words within a sentence.

Studies of Children's First Words

Certainly, first words have always been viewed very much as part of the child's context, usually of his activity (de Laguna, 1927).

> The word at first has an ill defined meaning and an ill defined value; it refers to a nebulous complex factually and

> emotionally; only gradually do its factual and emotional components become clear resulting in lexical and syntactic discriminations. (Leopold, 1949, 5)

Vygotsky (1962, 128) writes:

> At first the child uses verbal forms and meanings without being conscious they are separate. The word to the child is an integral part of the object it denotes.

Nelson (1974) has noted the most frequently occurring first words are words associated with ordinary childhood activity, like "car," "ball," "truck," "shoe." Seldom do children first name objects which they do not touch or move. A fuller discussion of the nature of children's holophrases (first word/sentences) will be noted below.

Nelson also notes that, in developing vocabulary, children will invent words which reflect their pre-existing conceptual organization, but may not match that of the language community. It is also characteristic of children to generalize the use of newly acquired words to other similar objects. On the other hand, the partial meaning a child initially grants a word will be determined by the limited experience he has had with it. Vocabulary development then depends upon the child's ability to both generalize and differentiate the meanings he acquires for words. His semantic growth consists of completing entries in his "dictionary" for words already acquired, as well as the acquisition of new words (McNeill, 1970b). The means for accomplishing this task are well established in pre-school years (di Vesta, 1966); but semantic growth after

age five is slow and gradual (Dale, 1949; Bruner, 1978). Clark (1971), for example, was able to distinguish four stages in young children's acquisition of the words "before" and "after." They first understood neither word, then grasped "before" but not "after." Later, "after" was interpreted as "before"; finally both words were understood. It is generally assumed that children learn concrete terms before more abstract ones (Ervin and Foster, 1960); subordinate terms before superordinate terms (Schaeffer et al., 1971). However, Brown, in an interesting paper (1957), "How Shall a Thing Be Called?", suggests that children's acquisition of names may depend as much upon the naming practices of adults as upon any predicable progression from concrete to abstract terms.

Types of Vocabulary Studies

Russell suggests that "the important fact about a child's vocabulary may be not the number of words he recognizes superficially but the quality of associations with different words" (1962, 170). Bibliographies of vocabulary studies include listings of research into both dimensions of children's semantic development. Dale (1931, 1949), in his comprehensive indices of vocabulary studies, classifies the types of research undertaken: total word counts, proportionate numbers of parts of speech, estimates of vocabulary and word frequency counts. Dale also outlined the various ways in which a child comes to "know" a word: he understands it, responds to, uses, reads it; can give different shades of meaning and define it. Undoubtedly, the most often used tests are those measuring

receptive vocabulary like the Peabody Picture Vocabulary Test (1959). But other studies have developed measures to probe other aspects of word meaning. Gerstein (1949) borrowed from concept development theory to construct a scale for scoring children's definitions of words taken from the Fleschler-Bellvue Scale. She categorized responses as descriptive, functional or categorical, giving the highest score for categorical (the most abstract) definitions. She found that the number of categorical responses increased with age. A similar study by Feifel and Lorge (1950) classified children's responses into 5 different categories (synonym; use and description; explanation; demonstration and others, errors) and supported, in the findings, Gerstein's correlation of the number of abstract responses and increase in age. Berwick (1959) developed a measure to test grade 4-8 children's knowledge of the multiple meanings of words among five choices and found that older children favored the more categorical responses. In a more recent study, Litowitz (1977) found that functional definitions are related to age and size of vocabulary and that synonymic definitions develop very slowly in children. She defended stoutly the usefulness of investigating children's definitions--"Language experience (the ability and facility, through language, to code perceptual information into the verbal mode) is reflected in the definitional form" (1977, 302). Russell (1962) asked children to choose the best definition, among five, for familiar words. He found that the older children tended to choose the more abstract definitions but felt that a test of

qualitative responses may be considered as much a test of mental ability as of vocabulary.

Summary

This section has considered those studies undertaken to develop a theory of semantics. It proves to be a much more difficult task than developing a theory of syntax. This difficulty is reflected in children's own semantic development which is much slower than their growth of syntactic control. It is similar in that semantic growth, like syntactic development, appears in the main to be a process of increasing differentiation, as more and more referential and syntagmatic features are acquired for the words in the child's vocabulary. Not only do the number of words within his "dictionary" grow, but the entries for each item become more detailed and interrelated with other entries. This section concluded with a short review of some of the different types of vocabulary studies which indicate the differences in extent and nature between the young child's and the adult's.

4. MORE RECENT STUDIES: SYNTAX-SEMANTICS

Many studies of language development present correlations among syntactic and semantic features (McCarthy, 1930; Fisher, 1934; Templin, 1957; Minifie, 1963; Strickland, 1963; Fox, 1972). Generally, scores on vocabulary items and on syntactic items are significantly correlated.

The grammar studies of the 1950's reported in the second part of this review above, however, focussed solely on the child's

acquisition of rules similar to those of orthodox transformational grammar, with little regard for semantics and none for pragmatics. The studies completed more recently appear to have emerged as a rebuttal to the Chomsky point of view; lately, investigators have attempted to bring semantic and syntactic processes into a single focus, and to emphasize the importance of context and pragmatics in human language.

Theoretical Papers on Grammar and Meaning

Fillmore (1968) does not appear to have "inspired" the psycholinguistic research in the 1970's as Chomsky's transformational grammar did during the 1960's. Nonetheless, his idea of "case grammar" provides a theoretical framework for much of the recent work:

> The substantive modification to the theory of transformational grammar which I wish to propose amounts to a reintroduction of the conceptual framework interpretation of case systems but this time with a clear understanding of the difference between deep and surface structure. The sentence in its basic structure consists of a verb and one or more noun phrases, each associated with the verb in a particular case relationship. . . . These relationships . . . include concepts as Agentive, Instrumental, Objective, Factitive, Locative, Benefactive (etc.). . . . Verbs are subclassified according to the case environments, which accept them, and the semantic characterizations of verbs relate them either to specific case

elements in the environment or to elements containing features (such as animateness) introduced as obligatory accompaniments to particular cases. (1968, 32)

Joan Tough draws similar connections between grammar and meaning:

> Transformational grammar "works" because linguistic formulae have emerged because of man's innate capabilities for processing perceptions and articulating sounds, both of which provide constraints within which language must develop . . . deep structure is not the underlying meaning itself, but the framework through which meanings can be organized. . . . Deep structure would seem to refer to the capacity of human beings to differentiate objects from actions through which objects are related, and to recognize the temporal sequencing of events when the "actor" initiates action that consequently relates to the acted upon. (1977, 32)

The two most important differences here, from the transformational grammar theory, are the inclusion of meaning in the discussion of grammar, and the centrality of predicate relationships in the formation of English sentences.

In another theoretical paper discussing grammar and meaning Karmiloff-Smith suggests that "the pendulum seems to swing back and forth between syntax and semantics the way it has between nature and nurture" (1978, 3). However, she also points out that Piaget has argued that syntactic/semantic progress is always based upon general conceptuo-structural development. All language users employ phonological, semantic, syntactic and pragmatic procedures

in producing and comprehending sentences, in finding and expressing meaning. Earlier, Katz and Fordor (1963, 210) felt that much confusion had been generated in the study of language by a search for a line between grammar and semantics.

> [The problem is obviated] once we stop searching for a criterion to decide which markers are properly syntactic and which semantic and ask instead whether the line between grammatical and semantic markers can be drawn in terms of the theoretical functions they perform. . . . Grammatical markers mark the formal differences on which the distinction between well-formed and ill formed strings of morphemes rests, and semantic markers give each well formed string the conceptual content that permits it to be a means of genuine verbal communication.

Thus, syntax and semantics are regarded in their view as complementary and essential dimensions of language.

McCawley (1968) acknowledged Katz and Fodor's contribution but criticized their theory as incomplete as it does not consider the problem of words with more than one meaning. There is, for example, a difference in the meaning of the word "sad," used to describe a person, or to describe a book, and the two meanings cannot be used interchangeably. The sentence, "John is as sad as the book he read yesterday" is anomolous, but this fact cannot be explained by Katz and Fodor's theory. McCawley (1968, 165) suggests two necessary components of a grammar: "a formation-rule component which specifies the membership of a class of well-formed semantic representations

and a 'transformational component' which consists of rules correlating semantic representations with surface syntactic representations." Using the language thus depends upon both syntactic and semantic procedures.

Studies into Grammar and Meaning

Experimental studies have been made into the relationship between semantic meaning and the "word classes of formal equivalents," or parts of speech. Brown (1957) hypothesized that native speakers of English are inclined to think of parts of speech semantically: i.e. adjectives-qualities; nouns-substances and verbs-processes. Among 16 3-6 year old children, Brown found that most children who had been shown a picture to illustrate a nonsense count or mass noun or a verb, could identify an "equivalent" picture, i.e. if presented with a verb, the children, in most cases, chose a picture showing action. In his discussion, Brown maintains that most words have an additional kind of "appropriateness" stemming from their grammatical character and that part of speech membership is thus a clue to meaning.

Kean and Yamamoto (1965) worked with 67 children in kindergarten and the 2nd and 4th grades in another study probing the use of syntactic clues to discover meaning. They presented to the children six words which can function as either count nouns or transitive verbs (bluff, blur, censor, garb, pelt and spike); each word was given in a complete sentence and the children were asked to guess the meaning of the word. Homogeneous (paradigmatic)

responses, which increased in number with age, were interpreted as an indication of syntactic cuing. The authors felt the children used syntactic signals to cue meanings of new, unknown words and thus efficiently expand their grammatical system.

Johnson (1967) correlated results from Osgood's Semantic Differential and word position in a sentence. Working with 57 adults, he asked them to rate the meaning of nonsense syllables in sentences like the following: The NIG hurt the GAQ (high and low potency verbs were chosen). He found that nonsense syllables used in the Active Subject positions were more active and potent than those in the Active Object position; that those in the Passive Subject position are more animate than those in the Passive Object position. It appeared that the position a word occupied in a sentence affected the rated meaning of that word.

Using a word association technique, Ervin-Tripp (1961), with 180 children at the kindergarten, grades 1, 3, and 6 levels, found that older children increasingly gave responses in the same grammatical class as the stimulus. The young child was more likely to respond to a stimulus like "black" with a word such as "cat" (a syntagmatic response) but as the child learns more and more of these responses, they may conflict, and instead, he will be inclined to give a paradigmatic response, e.g. "white." Palermo and Jenkins (1963) and Brown and Berko (1961) have also conducted studies using word associations with similar results.

Anglin (1970), in an intriguing series of studies with twenty words (five nouns, prepositions, verbs and adjectives), asked 40

children from grades 3/4, 7/8 and 11/12 and college to group the words according to meaning. He found that older children and adults tended to put words of the same part of speech together more often than did younger children. He also found that adults could remember groups of paradigmatically similar words more easily than children were able to. Anglin wondered why children, who treat members of grammatical classes as equivalents in their spontaneous speech, do not do so in the testing situation. He reasoned that the implicit knowledge and ability to use such grammatical rules appears first in children's speech; only much later can children articulate these rules and use them in a metalinguistic sense when they are asked to solve linguistic "problems" or are asked to judge the grammaticalness of sentences.

Finally, in a comprehension test of relational statements taken by 5, 7 and 9 year old children, Huttenlocher and Strauss (1968) found that children used grammatical position as a clue to meaning. The children were required to place one item relative to a fixed second item. It was easier to place the item that was the grammatical subject of the statement relative to the one that was the grammatical object rather than vice versa. Older children were generally more proficient but still took longer to place the toy which was named as object of the sentence. The author suggests that "the experiment indicates that the extra-linguistic situation may determine the logical actor and the logical actor must be the grammatical subject in order for the children to understand (1968, 304).

All of the above studies illustrate some aspects of the relationship between word meaning and the word's position in a sentence; they all validate in some way the interdependence of the syntactic and semantic systems.

Studies into Early Word Combinations

Another approach to the question of the relationship between syntactic and semantic processes is found in the early work of Lois Bloom (1971). In a refutation of a specific aspect of the child grammars of the 1960's, Bloom asked, "Why Pivot Grammars?" Her attack was on the distributional studies of Braine (1963); Brown and Fraser (1963) and Ervin and Miller (1963) who had suggested that young children seemed to categorize words into two classes: pivot and open; function and content; operators and non-operators. (All these classes were roughly equivalent.) Bloom studied three children in an attempt to propose rules of grammar to account for the inherent semantic relations that underlie the juxtaposition of words in early sentences.

> Certain words often occur in children's speech apparently because of the nature of their referential function. Description of such utterances as pivotal is only a superficial description of relative frequency of occurrence and syntactic position. . . . Rules that account for utterances in terms of the juxtaposition of pivots and open words cannot account for differences in semantic interpretation. . . . It was apparent that the children in the study were talking about the relations

> between actors or agents, actions or states or objects or goals, and that the order of constituents reflected the underlying order of basic sentence relations with remarkable consistency, e.g. subjects and verbs preceded objects or goals. (1971, 44-46)

In a later study, Bloom, Lightbown and Hood (1975) worked with four children using a methodology similar to Brown's (1973). With no specific system in mind, she considered the children's utterances and the context in which they were spoken. From her corpora, Bloom established what she labels semantic-syntactic categories: action, locative action, locative state, notice, state, intention. The authors conclude that "it has become increasingly clear in linguistic theory that semantics and syntax are mutually dependent and inseparable in any theory of grammar" (1973, 28). They continue: "Semantic complexity cannot be separated from syntactic complexity; both represent the linguistic complexity that influences the course of development. On the other hand, one can look at cognitive complexity apart from linguistic complexity" (1973, 32).

In his paper, Schlesinger (1971) outlines similar semantic-syntactic categories and writes that these are general cognitive rather than linguistic categories. Bowerman (1978), with evidence from her own cross-cultural studies, supports Bloom's position that the earliest categories children seem to use are semantic rather than syntactic. Braine reflecting upon his review of current theories as well as his own study, concludes that "the first productive structures are formulae of limited scope for realizing specific kinds of

meaning . . . not broad rules of phrase or sentence composition but much narrower or semantically (conceptually) defined" (1976, 4).

Brown (1973) cautions that "the first two and three word utterances of children . . . constitute only part of the total set of possible word orders." The de Villiers (1973), following Brown's observation, suggest that the early word orders correspond, in the main, to the semantic relations that an adult would judge appropriate from the context: e.g. agent-object, possessor-possessed. The consensus of the most recent investigations into early child language is that the first word combinations owe more to semantic processes than syntactic, as had been thought formerly. Braine says, rather succinctly, that "literature has overestimated the syntactic competence of very young children" (1976, 93).

The later studies are more concerned with seeing how the syntactic and semantic processes function within the child's linguistic context, rather than with establishing "pure" theories about one particular aspect of language development. According to Sinclair de Zwart (1973), Piaget maintains that the child brings not innate linguistic structures but rather innate cognitive functions with him. Linguistic structures depend upon universal thought structures, which in themselves are a necessary outcome of the equilibration processes. Thus cognitive structures, developed through the operations of the sensory motor period, can be used to explain basic language structures, for example, ordering spatially and temporally, classifying actions and relating objects and actions to actions.

> The way in which sensori motor schemes are coordinated into practical groups, become transformed into operations, would determine the manner in which linguistic structures are acquired. (1969, 333)

Branston (1976) labels this theory the "cognitive-semantic" view of language acquisition and in non-Piagetian terms states that "Evidence is accumulating that [shows] early concepts [which will subsequently be symbolized into words] are based upon perceptual information from the environment and are particularly influenced by dynamic, action orientated perceptual events."

The outstanding characteristic of children's first words, according to Nelson (1974), is their basis in dynamic or functional relations; they almost invariably refer to things that move or change in some way, that the child can act upon. Nelson's work in particular supports Fillmore's contention that predicate relations are of central importance in the development of syntax. For Nelson, verbs, which express the "functional core" (i.e. the relations a concept may enter) of an idea, are most significant.

> An object is first identified as having important functional relations; that these relate the object to self and other people through a set of acts; and that perceptual analysis is derivative of the functional concept, not, a priori, essential to it. (1974, 284)

The child is first aware of these relations in a single instance, then in others; other objects may acquire status within the same relationship. All concept acquisition depends upon both the

"functional" and "attributive" processes; Nelson believes the "functional" (i.e. predication) is primary and the basis for subsequent syntactic knowledge as well as concept development.

This is a very different position from the one taken by Werner and Kaplan (1963) who proposed that children's first "words" are really vocables which amount to naming behavior. "A name becomes a word only insofar as it fulfills a grammatical and syntactic function beyond its role as designator of something." More ambiguously, Rommetveit suggested that the early one word utterance has apparently neither the status of a word or of a sentence, but constitutes a matrix out of which both semantic and syntactic structures emerge (1968, 242).

McNeill (1970a) agrees with Nelson in principle. He views the young child as operating with meanings which are first embodied in grammatical relationships; each word is paired with several such meanings. Later, the child will begin to consider individual words and to elaborate a system of referential and other syntagmatic features for each one. This process, a life-time development, continues as new words, at first meaningless, are encountered in familiar linguistic and non linguistic contexts.

Summary

This section of the review has surveyed some of the more recent studies which have viewed semantic and syntactic development as joint rather than independent processes in the growth of the child's language. The notion that children acquire rules that map conceptual

relations and categories into syntactic positions in utterances, that syntactic relations are first conceived in the pre-linguistic activity of the sensori motor period is a radical theoretical shift from Chomsky's idea of innate syntactic structures. It appears, moreover, that the sheer complexity of the cognitive-semantic theory is useful in explaining why children's semantic development is so much slower than their acquisition of a syntactic theory which enables them to comprehend and produce a variety of sentences at such an early age.

5. CONCLUSIONS

In the vast collection of papers on children's language published during the past 80 years a few persistent observations about the nature of early language are frequently mentioned and more than a few recurring questions are continuously raised. This chapter will be concluded with a summary of these observations and questions.

Descriptive studies of individual and of large numbers of children generally conclude that before a child enters school his grammar is approaching the adult speaker's. He may use simpler constructions and fail to adhere to all the rules governing inflections, but his speech in nursery school reveals most of the structures of adult speech, the same proportion of parts of speech, phrasal and clausal modification and few errors (Menyuk, 1963, 1971; McNeill, 1966). Children have learned their language in an astonishingly short period.

Researchers involved in longitudinal studies consistently view the child's language development as a gradual process of differentiation, from the use of very imprecise, global utterances to more controlled and refined structures (Leopold, 1939; Carroll, 1960). Brown (1973) suggests that children pass from levels of less to greater complexity, a progression which is also observed by Menyuk (1970) and Lee and Canter (1974). Carroll (1964), Brown (1970), McNeill (1970), Nelson (1974) maintain that a similar direction of increasing differentiation is evident in the child's conceptual and semantic development.

Longitudinal studies also reveal a fairly regular sequence of emerging grammatical features. The acquisition of particular sounds in the language (phonemes), of inflectional and derivational word endings (bound morphemes) and of characteristic sentence structures appears to follow a rather invariant sequence among children, even among those who speak different languages (Menyuk, 1963, 1970; Brown, 1973).

If adult language is viewed as the terminal goal of development, then most studies distinguish quite clearly between growth in syntax which is remarkably swift, and growth in word meanings, which is much slower (Anglin, 1968; Brown, 1973; Bruner, 1978; McNeill, 1970). Growth in word meaning appears to be much more vigorous than syntactic maturation during the school years (Anglin, 1968; Chomsky, 1968; Teifel and Lorge, 1950; Gerstein, 1949).

From a consideration of the available data, however, linguists and psychologists have raised questions even more compelling than

any observations they have made.

Chomsky's puzzlement over how children learn to project from a finite number of sentences they hear to the infinite number they are able to produce has been reiterated by every major investigator (Cazden, 1965; Menyuk, 1970; McNeill, 1970; Katz and Fodor, 1963). Any "answer" remains hypothetical.

Psychologists like Brown (1973) question how children are able to improve steadily in the direction of the adult model. Kessel (1970) wonders how children achieve this improvement so quickly. Are there critical years for the acquisition of language?

Linguists want to know what it is children learn when they do acquire the syntax of a language (Griffin, 1968). Chomsky (1959), Carroll (1966), McNeill (1970) caution that an adequate grammar of adult language is necessary before researchers can accurately judge what the child has accomplished. Goodenough (1938) and Bloom (1975) maintain, however, that an adult grammar is not a useful tool to explore the child's language. Is the child's early language different in some profound, structural sense (Brown, 1973; Bloom, 1975)? On the other hand, researchers seem to concede that a valid and exhaustive theory of semantics is an impossibility.

Any review of the studies across language abilities pose questions about the relationship between different aspects of language development. McNeill (1970) asks if there is a relationship between syntactic and semantic information. Nelson (1970) investigates the relationship between the child's acquisition of conceptual knowledge, learning of words and production of his first sentences.

In 1968, Rommetveit framed the following question in a review of current research: What is the relationship between the child's knowledge of word meanings and his ability to produce and comprehend sentences? It was this last question which prompted the present study.

Chapter III

THE DESIGN OF THE STUDY

The purpose of this chapter is to outline the nature of the sample used in this study, the type of instruments selected and designed for the research, and the scoring procedures employed. The chapter concludes with a brief summary of the statistical data which was made available for analysis.

1. POPULATION AND SAMPLE

Subjects for the present study were selected from two pre-school programs located in middle class districts of Edmonton. Criteria for selection included: English as the maternal language; an age between 60-72 months; normal mental, social and language development, as estimated by the teacher; and a willingness to participate in the study. These criteria were met by 11 boys and 14 girls who attended a full-time Day Care. In order to increase the sample size, an additional two boys and three girls were obtained from a half-time Kindergarten program, using the same criteria for selection.

2. TESTING AND SAMPLING INSTRUMENTS

Instruments and procedures were selected to sample five aspects of language skill: word meaning recognition, word meaning definition, word order comprehension, word order production and five selected features of a spontaneous language sample.

Word Meaning Recognition

Form A of the Peabody Picture Vocabulary Test (PPVT) was individually administered to each child following the procedure outlined in the manual (Dunn, 1959). In brief, comprehension of each item is tested by presenting a spoken word and four pictures, the child's task being to point to the correct illustration of the test word. Items are arranged according to difficulty and testing is discontinued when six errors occur within a sequence of eight consecutive words. The average testing time per child is 15 minutes. The Peabody Picture Vocabulary Test is a fairly well established vocabulary recognition test, most frequently used as a measure of verbal intelligence (Buros, 1975).

Word Meaning Definition

Each child was asked to provide an oral definition of the first 50 words of Form A of the PPVT (see Appendix A). The following protocol was used:

I am going to say a word and I would like you to tell me what it means. You may tell me anything you like about the word.

Easy words were presented as practice items and relevant responses were reinforced until the child provided adequate definitions for the practice stimuli. Laconic children were encouraged to respond by the question: Is there anything else you can tell me about that word? No comments were made by the investigator to responses on the actual test.

Development of Word Order Tests

A variety of approaches has been taken to the problem of assessing a child's syntactic maturity. The purposes for such assessments also vary. Thus Berko's study of morphological skills (1958), Brown's exhaustive studies (1973) and The Imitation-Comprehension-Production Test (ICP) developed by Fraser, Bellugi and Brown (1963) were designed to gather data to enable researchers to describe language development and to hypothesize about the learning strategies behind that development. Other measures such as the Northwestern Syntax Screening Test (1969) (NSST) were intended to be used as a screening test only, not a measure of general syntactic development. The sentence comprehension test proposed by Pizzamiglio was originally used in Italy to study the linguistic abilities of aphasic patients.

All of the above measures involve children in a highly structured task situation which is designed to elicit responses from them to pictorial and/or spoken stimuli. The NSST, the ICP and the Pizzamiglio test for sentence comprehension were the tests most relevant to the instrument used in the present study.

To probe the child's comprehension of a given sentence, each of these tests employs a similar procedure. The subject was presented with either two pictures (ICP, Pizzamiglio) or four pictures (NSST) (two pictures here are decoys). He was asked to indicate which picture represented the sentence which was simultaneously read to him. In the NSST and the ICP, the child is read two sentences, that is, two possible interpretations of the pictures; then

only one of the two sentences is repeated to the child, and he is asked to point to the picture which corresponds to the latter sentence. One of the two pictures is correctly described by the sentence; the other corresponds to a sentence which is identical to the first except for a syntactical contrast. A syntactic contrast is created by the use of two utterances which are similar except for a change or reversal of specific grammatical feature. For instance, to show the subject-object contrast, one picture showing a cat chasing a mouse and another showing a mouse chasing a cat would be presented to the subject. He was asked to indicate which picture corresponded to the sentence "The cat is chasing the mouse."

The Pizzamiglio test measures only comprehension of specific grammatical constructions; however, both the NSST and the ICP also attempt to assess the subject's expressive syntactic ability. To do so, the child taking the NSST is asked to view two pictures which illustrate two syntactic contrasts and to repeat two sentences which correspond to the pictures. The examiner then points to one of the pictures and asks the subject to produce the appropriate sentence.

Fraser et al., in studying the children's production of appropriate syntactic forms, presented each subject with two pictures and two corresponding sentences (which featured a grammatical contrast). The child was not told however which sentence went with a particular picture. After repeating these sentences, the examiner pointed to one picture at a time and asked the subject to name it. In scoring these responses, the investigators were concerned only that the

subject could produce the particular syntactic construction; modifications in the remainder of the sentence were ignored.

The test items for this study for the syntactic comprehension and production tasks were adapted from the above measures. The ICP, NSST and Pizzamiglio tests include items testing a wide range of syntactic features (e.g. prepositions, pronouns, affirmative/negative, phonetic distinctions, tense, questions, mass nouns/count nouns, active voice/passive voice, direct/indirect object).

Two concerns arose regarding the actual items and the procedures used in the above mentioned tests. Firstly, many items appeared to test the child's comprehension of word-referents as much as his syntactic development; for example, a) the masculine/feminine contrast in the Pizzamiglio test: "The lad kisses the boy vs. the girl; b) the prepositions used in an item in the NSST: "The cat is behind the desk/The cat is under the desk." Secondly, in the expressive portions of both the ICP and the NSST, the child is asked to hear two sentences before he is asked to repeat one of the sentences in order to identify a given picture. He is actually imitating rather than producing a sentence.

In an attempt to develop a short test which would focus more narrowly on one aspect of syntactic maturity, namely, word order, and would place greater emphasis on the child's ability to produce a new sentence rather than repeat one he had heard, the word order test was developed for the present study. The child was involved in using information conveyed mainly by the different word order in two utterances, to comprehend and produce meaningful sentences.

Word Order Comprehension and Production Tests

Word order tests were developed by the writer from studies by Fraser, Bellugi and Brown (1963), the Northwestern Syntax Screening Test (1969) and the Test for Sentence Comprehension (Pizzamiglio, 1968). The following grammatical relationships, which were thought to pertain specifically to the word order of sentences, were examined:

1. subject/object, active voice
2. subject/object, active voice, inverted word order
3. subject/object, passive voice
4. subject/object, passive voice, with modifiers
5. direct/indirect object
6. subject/indirect object in sentence which contains noun clause as a direct object
7. direct object/object of modifying adverbial phrase
8. subject of main clause/subject of dependent adverb clause
9. adjective construction modifying subject/adjective construction modifying object
10. reversal of terms in object slot of two prepositional phrases

Two contrasts were used to test each relationship except for No. 8 which involved only one item, for a total of 19 items. The actual stimulus sentences used are shown in Appendix B.

In order that the subjects would not establish a response pattern based upon a particular group of grammatical relationships, the individual test items were randomized. To minimize the order

effect further, decoy items which involved other types of grammatical relationships (e.g. singular/plural, tense) were interspersed among the test items.

Word Order Comprehension Test

The purpose of the comprehension test was to assess the child's understanding of the sentences spoken by the examiner. The child was required to point to which one of two pictures presented to him corresponded to the sentence he was hearing. For instance, to present a subject-object contrast, one picture which showed a cat chasing a mouse and another which depicted a mouse chasing a cat would be presented to the subject. He was asked to indicate which picture corresponded to the sentence "The cat is chasing the mouse."

The following protocol was used:

> I am going to show you two pictures and I want you to listen to what I say. Then I'd like you to point to the picture which shows what I said.

Two pairs of pictures with corresponding sentences were presented as practice items and the children's appropriate responses were reinforced.

Word Order Production Test

In the production test the child was required to describe pictures, in order to demonstrate his ability to produce the same syntactic structures which were examined on the syntax comprehension test. Each test item involved the presentation of line drawings one of which illustrated a sentence spoken by the examiner. The child was asked to produce a sentence which told what was happening

in the second picture, i.e. the one not described by the examiner.

This could most readily be done by reversing specific items in the sentence which had been spoken by the examiner. For example, the examiner explained one drawing by saying, "The cat followed the dog." The second picture illustrated the opposite situation; it could readily be described by "The dog followed the cat." The following instructions were given during the test:

> I am going to show you two pictures. I am going to tell you about one of the pictures and I want you to tell me about the other one. Try to make your sentence as much like mine as you can.

Practice items were presented to the children and relevant responses were reinforced until the child produced sentences which met the minimal requirements for a correct response (see Appendix C).

The Language Sample

Wilson (1969), Rogers (1975) and Menyuk (1973) have shown that children's fluency, vocabulary and syntactic structures will vary across language tasks. In order to obtain fairly representative samples of the children's spontaneous language production, four different stimuli were presented to each one individually. The child was allowed to say as much or as little as he wished. The order in which each child completed the four tasks was varied.

1. The child was asked the following question: "If you were a teacher in a Day Care (or Kindergarten), what would you do with the children?" To encourage a complete

answer, the question was repeated if the child ran down.

2. A film strip of Where the Wild Things Are by Maurice Sendak was shown to each child. All the children had previously been read the book of the same title. The following instructions were given. "I have a short film here and I'd like you to tell me what you see in each picture." If the child merely listed objects which he saw, the instructions were expanded to, "Tell me what is happening in the picture."

3. Mercer Meyer's book, "A Boy, A Dog and A Frog" was shown to each child. He was told that, "This is a funny book because it has no words. I'd like you to tell me the story as you look at the pictures." None of the children was familiar with this book.

4. The child was presented with a small balancing toy. As he and the examiner manipulated the parts of the toy, he was asked specific questions.
   a) I'd like you to tell me what this is.
   b) How would you play with it?
   c) What happens if I take these two blocks away?
   d) What would you do with the blocks I've taken away?

3. TESTING PROCEDURES

All testing was carried out by the writer in a quiet location in the child's school. Each of the children was interviewed privately for 1½ hours over the course of three days. The order of

presentation of the different language tasks was systematically varied to counterbalance any possible order effect.

All of the children's oral responses were tape recorded. No attempt was made to conceal the recorder from the children.

4. SCORING OF TESTS AND LANGUAGE SAMPLE

General Observations

All of the children were enthusiastic and responsive in the testing situations. As each child was seen on three separate occasions, none of the children became tired during the relatively short testing sessions (25 minutes). The individual language tasks required approximately the following times to complete:

Word meaning recognition (PPVT)	15 minutes
Word meaning definition	20 minutes
Word order comprehension	10 minutes
Word order production	20 minutes
Language sampling	30 minutes

None of the children experienced any difficulty with the testing procedures, nor were they distracted by the tape recorder.

Scoring Procedures

All the responses, including those which were transcribed, were scored by the researcher.

Word Meaning Recognition Scores

Scoring of the Peabody Picture Vocabulary Test was straightforward since precise directions are provided by the manual.

Performance is measured in terms of a raw score which is calculated by subtracting the total number of errors from the ceiling figure (i.e. the last item presented).

Word Meaning Definition Test

The definitions given by each subject to the first 50 words of the PPVT were categorized according to a scale developed by Gerstein (1949). Gerstein identified three categories of definitions: a) descriptive, b) functional, and c) categorical. By the first method, descriptive, the subject may recall, in concrete terms, the properties of the object or the action he has been asked to define. A functional definition involves recall of the use or purpose of the referent. Definitions given in terms of class membership are regarded as categorical.

The following scoring principles were used by the investigator.

1. If more than one definition were given to any single word, the "highest" level of definition was used.
2. Particularly troublesome to classify were definitions offered for the ten participles included in the Peabody list, e.g. picking, sewing. If a concrete example of any object, which might receive the action of the verb, were given, the definition was classified as descriptive, e.g. "catching--a fish." Responses based upon the child's consideration of the participle as a noun were usually classified as functional, e.g. "a building is something that you live in." Responses which defined an action in terms of a class of actions, e.g. "sewing--mending,

stitching" were classified as categorical.

3. Those definitions which could not be classified according to Gerstein's scale were considered errors.
4. In some instances, it was possible to infer that the child had developed some notion of the concept but he did not offer any evidence of the linguistic ability to express his idea. If he did possess such competence, he failed to realize the need to be explicit in expressing his thought to the examiner. For example, when asked about a kangaroo, one child replied, "Once we went to Storyland Valley Zoo and we saw one." Apparently, he was able to recognize the referent for the word given and could relate it to a particular context. However, any communication of the meaning of the reply in these situations depends heavily upon the listener's awareness of the child's non-linguistic context and upon inferences he can make about the speaker's intentions. The child's response alone does not constitute a classifiable definition. Hence, this reply and ones similar to it were classified as errors.

If, however, in defining the word "teacher," the child named, as an example, the name of his own teacher, his response was classified as descriptive. Jackson (1968) categorizes this method of defining as denotative, a type of description when the subject gives "a specific concrete exemplar of the concept."

Appendix D lists examples of the types of response given by the subjects for each word in the word definition test.

In order to obtain a score, a numerical weighting was assigned to each category. This weighting reflects Gerstein's assertion that the three methods of verbalizing a definition vary in complexity. Thus, the categorical approach, which is the most abstract, was weighted three, the functional, two and the descriptive, one. Errors were rated 0.

Using these values, it was possible to obtain a total definition score for each subject. The score was computed as follows:

Definition score = 3 x categorical definitions
+ 2 x functional definitions
+ the number of descriptive definitions

Word Order Comprehension Test

This test required the child to point to one of two pictures in response to a sentence spoken by the examiner. Thus the score was simply the number of pointing responses made to pictures which accurately illustrated the spoken stimulus.

Word Order Production Test

For this test the child was asked to produce a sentence which correctly reversed semantic items in a particular grammatical structure, which he had previously heard in a sentence. Responses were scored correct if the subject produced the required contrast. A score for each child was determined by totalling the number of correct responses.

The criteria for scoring each problem are shown in Appendix C; a response was marked correct if it satisfied these criteria; otherwise, it was marked incorrect. The following principles were followed in the scoring:

1. The sentence had to be judged complete to be scored, that is, contain a subject and a complete predicate.
2. Allowances were made, however, for some variations in the responses:
   a) Omissions--If parts of the sentence were omitted but the required reversal had been made, the sentence was scored "correct." This principle did not hold, however, for those items which involved modifying constructions. Here, the sentence was judged incorrect if the modification were omitted.
   b) Simple semantic substitutions of nouns or verb forms was allowed. Thus "The man is pulling the dog" would be accepted for "The daddy pulls the dog."
   c) Simple morphological errors were ignored: e.g. The boy has drinked.

The Language Sample

Samples of the subjects' language obtained during four different language tasks were first analyzed along five dimensions. The basis for this Level 1 analysis was the procedure used by Loban (1963) in his descriptive analysis of the language of 338 school children, from kindergarten to grade VI. This procedure was chosen to allow a general overview of the children's performance on five

fairly standard language measures (Strickland, 1962; Hunt, 1970; O'Donnell, 1967). The items for analysis included:

1. Total number of words in each sample across the four language tasks.
2. Number of communication units. Loban classifies a communication unit as "a group of words which cannot be further divided without the loss of their essential meaning."
3. The average length of communication unit.
4. Subordination index. Loban devised the following weighted index for subordination.
   - 1 point for each dependent clause
   - 2 points for any dependent clause modifying or within another dependent clause
   - 2 points for any dependent clause containing a verbal construction such as an infinitive, gerund or participle
   - 3 points for any dependent clause within or modifying another dependent clause, which, in turn, is within or modifies another dependent clause
5. Type-token ratio. The number of different words was computed over a uniformly selected sample of 100 words from each subject's speech.

A frequency count of the incidence of the above selected features was made for each subject.

The Developmental Sentence Score

The language sample was also analyzed along the developmental scale of syntax acquisition suggested by Lee and Canter (1974). This approach was taken to assess the correlation between Lee and Canter's instrument, which attempts to assess language development and the more descriptive measures suggested by Loban. The scoring procedure for the Developmental Sentence Score (DSS) which gives weighted scores to the developmental order of pronouns, verbs, negatives, conjunctions, yes-no questions and wh-questions, is outlined in Appendix E.

As Lee and Canter suggest, 50 consecutive sentences from a larger sample were selected for analysis. For each subject, sentences were used from responses to the story-telling task first, the explanation of a toy second, and if necessary, the description of a film task. The criteria for judging a sentence developed by Lee and Canter were used by the present examiner.

Scores were given for each sentence in each of eight classifications of grammatical structure. An additional sentence point was added to the total sentence score if the entire sentence was correct in all respects. Individual scores for the 50-sentence speech sample were totalled and a mean score per sentence was derived.

Statistical Treatment

The previous analysis yielded the following information for each subject:

1. raw scores, PPVT, Word meaning recognition task
2. derived scores, Word meaning definition task
3. raw scores, Word order comprehension score
4. raw score, Word order production test
5. incidences of selected features of the language sample
6. derived scores, Developmental Sentence Scores

Means and standard deviations were tabulated for each of the above variables to provide an overview of the performances of the children.

Correlations among the six variables were computed. T-tests were run to determine the level of significance of each of the correlations.

5. PILOT STUDY

Three months prior to the data collection, a pilot study was conducted by the researcher to test the procedures to be used in the word meaning and word order tests, and to determine the most effective ways of eliciting a language sample.

Five children, aged 60-72 months, were selected from a Day Care centre; each was administered the tests. The children were also asked, individually, to tell the examiner about a series of pictures, illustrating familiar childhood events, asked questions about their families and the day care and were asked how they would play with a large beach ball which was shown to them.

The children experienced little difficulty with the testing procedures; the protocols remained basically unchanged. However, the pilot study revealed that children were much more responsive

to certain kinds of stimuli in the sampling situation. Children were reluctant to discuss a picture which was in full view of both the child and the examiner. Similarly, they were generally uninterested in giving lengthy replies to queries about their everyday lives. The children did suggest ways of playing with the ball; however, it was decided in the main study to consider a more complex toy. Pictures were also used in the main study, but in the form of a film strip and a picture-book without words; these proved to be much more useful stimuli for the children's verbal expression.

The data collected during the pilot study also afforded the writer an opportunity to become more familiar with the scoring procedures which were used later.

6. SUMMARY

Chapter III has presented a description of the sample of children used in this study and of the instruments and sampling procedures used. The latter included a report of the development of the word order tests designed specifically for this study. The scoring procedures for the above measures were detailed, and the subsequent statistical analysis outlined. Finally, a brief description of the pilot study was given.

Chapter IV

ANALYSIS OF THE DATA

This chapter presents the findings of this study which investigated the relationship between the acquisition of word meaning and the development of control of word order within a sentence. Analyses were carried out on the following variables related to word meaning:

a) word definition score

b) word recognition score

c) total word meaning score, the sum of scores a) and b)

The variables related to syntactic development included:

a) word order comprehension score

b) word order production score

c) total word order score, the sum of scores a) and b)

Analyses were also carried out on the following variables related to the samples of the subject's language:

a) the incidence of selected syntactic features

b) the Developmental Sentence Score

The distribution of scores and the interrelationships amongst scores will be discussed separately for the word meaning measures, the word order measures, and the features of spontaneous language. Following the analyses of results on individual sections of the study, relationships between the two sets of variables will be examined.

1. SUMMARIES OF SCORES

Word Meaning Test Scores

Table 1 presents the mean number of responses and standard deviations in each of the four categories of word definitions.

SUMMARY OF SCORES FOR WORD MEANING MEASURES

MEASURE	$\bar{X}$	Range	S.D.
Word definitions			
Categorical	2.867	0-8	2.363
Functional	12.033	4-19	4.309
Descriptive	25.200	13-33	4.556
Error	9.900	2-22	5.256
Word Definition Weighted Scores	57.867		11.366
Word Recognition Scores	58.000		7.010
Total Word Meaning Scores	115.867		15.383

TABLE 1

The major strategy for defining words used by the children in this study was Descriptive, 25.2, compared with 12.03 using Functional definitions and 2.87 Categorical (the least used type) and 9.9 in the Error category.

The word meaning definition weighted score was computed according to a formula described previously. The mean score on this measure was 57.867, S.D. = 11.366.

The word meaning recognition score was, in fact, the subject's raw score on the Peabody Picture Vocabulary Test. The mean score for this sample of children was 58.000 (S.D. = 7.010). The norms established for the Peabody Test, Form A, ages 4-9 to 5-5 were 50.22 (S.D. = 8.17); ages 5-6 to 6-5, 55.37 (S.D. = 7.52) (Dunn, 1959, 28).

The total word meaning score as shown on the same table represents the sum of the subject's scores on the two above measures. As the table indicates, the mean of the total scores was 115.867 with an S.D. of 15.383.

Table 2 shows the correlations found to exist among the scores within the Categories of responses on the definition test, the weighted definition score, the word meaning recognition score and the total word meaning score.

INTERRELATIONSHIPS AMONG WORD MEANING MEASURES

	Word Def. Weighted Score	Word Recognition Score	Total Word Meaning Score
Categorical	.734 xx	.242	.652 xx
Functional	.777 xx	.266	.696 xx
Descriptive	- .118	.034	- .071
Error	- .865 xx	- .356 x	- .802 xx
Word Definition Weighted Score		.366 x	.906 xx
Word Recognition Score			.726 xx

x $p < .05$
xx $p < .01$

TABLE 2

It may be noted that the word meaning definition scores and the total word meaning scores correlate positively ($p<.01$) with the numbers of responses in the categorical and functional categories, but negatively with the number of responses in the error category. It was the descriptive category, however, which contained the greatest number of responses.

The correlation between the scores on the word meaning recognition test and the various types of responses within the word definition test were not significant at the 0.05 level.

The weighted word definition scores were found to be significantly related ($p<0.05$) to the word recognition scores.

It would appear from the above analysis that the child's ability to recognize a greater number of words is linked to his skill in defining words. It is not suggested that mature definitions are dependent upon a large recognition voacbulary, but rather, more likely, that both capacities develop simultaneously in the child. Generally, in this study, the expressive and receptive vocabularies were found to be related.

Word Order Test Scores

Means and standard deviations on the word order tests are presented in Table 3.

SUMMARY OF SCORES ON THE WORD ORDER MEASURES

MEASURE	$\bar{X}$	Range	S.D.
Word Order Comprehension Task	15.867	10-18	1.648
Word Order Production Task	9.833	0-15	3.416
Total Word Order Score	25.767	10-33	4.595

TABLE 3

The mean score on the word order comprehension test was 15.8; on the word order production test, 9.8, the maximum possible score on each test being 19. The mean total score, averaged over all subjects, was 25.7, out of a possible maximum of 38.

The fact that the comprehension scores are higher may support the theory that the child's ability to understand a syntactic construction generally precedes his ability to produce it (Fraser et al., 1963; MacCarthy, 1954; Menyuk, 1964). It should also be noted, however, that on comprehension tests of this type the child has a 50% chance of being correct even if he were quite incapable of understanding the sentence given to him: he is simply asked to point at one of two pictures (Fernald, 1972).

The scores on the comprehension test cluster around the mean ($\bar{X}$ = 15.8, S.D. = 1.6) much more than the scores on the production test ($\bar{X}$ = 9.8, S.D. = 3.4). The high proportion of near perfect scores on the comprehension test reduced the possible variance and for this reason the test appears to be limited in its power to

differentiate amongst the children's comprehension abilities in the upper range.

Interrelationships Among Word Order Test Scores

Correlations which were computed between the word order comprehension scores and the word order production scores (Table 4) were found to be significant at the 0.01 level. Certainly, among the children in this sample, responding to the instruments used, development of control of word order in comprehending and in producing sentences was found to be closely related.

INTERRELATIONSHIPS AMONG WORD ORDER TASK SCORES

	Word Order Compre. Task Scores	Word Order Production Task Scores	Total Word Order Scores
Word Order Comprehension Task Scores	-	.641 xx	.810 xx
Word Order Production Task Scores		-	.966 xx

xx $p < .01$

TABLE 4

Characteristic Features of the Samples of Children's Language

The five syntactic features investigated in the children's language samples included: a) total words, b) number of communication units, c) mean length of communication unit, d) type token ratio and e) subordination index.

The means and standard deviations for these features are presented in Table 5.

SUMMARY OF RESULTS FOR ANALYSIS OF
SELECTED FEATURES OF LANGUAGE SAMPLE
AND THE DEVELOPMENTAL SENTENCE SCORES

LANGUAGE FEATURE	$\bar{X}$	Range	S.D.
Total Number of Words	687.632	344-1077	205.739
Number of Communication Units	109.667	74-152	21.305
Mean Length of Communication Unit	6.203	4.8-9.8	1.127
Subordination Index	10.000	0-29	9.919
Type Token Ratio	.436	.29-.56	.066
Developmental Sentence Scores	8.585	5.54-14.20	2.051

TABLE 5

Verbal output was measured in terms of the total number of words each child used in the four language tasks. The mean number of words produced was 687.6 (S.D. = 205.739); samples actually ranged from 344 to 1077 words.

The total number of communication units, "a group of words which cannot be further divided without loss of their essential meaning" (Loban, 1963), averaged 109.7 (S.D. = 21.305); the fewest produced was 74; the most, 152.

The longest mean length of communication units for a subject was 9.8; the shortest, 4.8 ($\bar{X}$ = 6.2; S.D. = 1.127). These latter figures may be compared with those observed by Loban (1963) and O'Donnell et al. (1967) who also analyzed samples of kindergarten children's speech. In Loban's samples, the average length of the communication units was 4.8 (S.D. = 1.33); in O'Donnell's, 7.07

words. The mean length of utterance is generally regarded as a "robust tool" for measuring language development in young children (Fox, 1972; Brown, 1973).

Of course, any comparison of the results of different studies may reflect different sampling procedures as much as the various capabilities among the students. Although the specific tasks in the Loban, O'Donnell and the present study did vary slightly, each investigation involved children in interaction with a single adult. This particular sampling situation may elicit the most mature grammatical forms of which the child is capable (Lee and Canter, 1974); the results may not provide an accurate description of his verbal expression in some other situations, such as interactions with his peers.

The subordination index, which was calculated by allowing points for simple dependent clauses, verbals and complex dependent clauses, had a mean of 10, with a S.D. of 9.919. Such a range reflects high variability; some children used subordination much more than others.

The type token ratio for the sample studied averaged .436, with a S.D. of .066. Such a narrow range of scores on the type token ratio may be related to the sampling procedures. Involving young children in specific language tasks with identical materials and stimuli does help to standardize the language sample; however, the specificity of the tasks and materials may have the disadvantage of seriously restricting the child's range of expressed vocabulary. He needs only certain words to complete the task, and the nature of

the language stimulus does not encourage him to expand his choice of words.

The mean on the Developmental Sentence Score was 8.585, with a S.D. of 2.051. The range was 5.54 to 14.20. This score was slightly below the mean scores Lee and Canter ranked in the 50th percentile for children of this age (5-0 to 5-5: 9.04; 5-6 to 5-11: 8.92).

Interrelationships Among Selected Features

Table 6 presents the interrelationships among the incidences of selected features across the language samples.

INTERRELATIONSHIPS AMONG SELECTED FEATURES
OF THE LANGUAGE SAMPLE

	Total Words	Number of Communication Units	Mean Length of Communication Unit	Subordination Index	Type Token Ratio
Total Words	-	.819 xx	.795 xx	.759 xx	.133
Number of Communication Units		-	.318	.523 xx	- .010
Mean Length of Communication Unit			-	.677 xx	.209
Subordination Index				-	.217
Type Token Ratio					-

xx $p < .01$

TABLE 6

The total number of words a child spoke was closely correlated ($p<.01$) to the number of communication units he produced, the mean length of his units and the derived subordination index. The subordination index, itself correlated significantly ($p<.01$) with the number and mean length of communication units produced.

It would appear from these findings that the number of communication units a child produced has little bearing on the average length of those units. It could be that as children learn to embed one sentence within another by using verbals and subordinate clauses (subordination index) that their utterances will become longer and fewer in number. The fact that the total number of words correlates highly with the mean length of the units would support this pattern of development. That is, as children develop, they may produce more and more complex language. The actual number of communication units, as a result, may, in fact, decrease. Loban (1963) noted a similar result in his longitudinal study of children's language.

It may also be noted that the child's type-token ratio was not significantly related to any other measure of his language in continuous discourse.

2. INTERCORRELATIONS AMONG WORD MEANING SCORES, WORD ORDER TEST SCORES, SELECTED FEATURES OF THE LANGUAGE SAMPLE, AND THE DEVELOPMENTAL SENTENCE SCORES

Correlations Between Word Meaning Scores and Word Order Scores

Table 7 presents the correlations found between the word meaning scores and the word order test scores.

CORRELATIONS BETWEEN WORD MEANING TEST SCORES
AND WORD ORDER TEST SCORES

	Word Order Compreh.	Word Order Production	Total Word Order Score
Word Recognition Score	.274	.434 x	.411 x
Word Definition Score	.282	.567 xx	.518 xx
Total Word Meaning Score	.333	.617 xx	.570 xx

x $p < .05$
xx $p < .01$

TABLE 7

The scores on the word order production test are significantly ($p<.05$) related to the word recognition scores. However, there is a correlation at a higher level of significance to be found between the two expressive measures, the word order production test and the word definition scores. Positive correlations of high magnitude ($p<.01$) also occur between the total scores; that is, the composite word order and word meaning scores. No significant correlations were found between the word order comprehension scores and any of the word meaning scores. The most important observation of these figures is that the word order production scores correlate significantly with all the word meaning scores; word order comprehension scores do not.

Correlations Between the Word Meaning Scores and the Incidence of Selected Features in the Language Sample

Scores on the word meaning measures were correlated with the syntactic features of the language sample which had been tabulated, and with the Developmental Sentence Score (Table 8).

CORRELATIONS BETWEEN WORD MEANING SCORES
AND THE INCIDENCE OF SELECTED FEATURES IN THE LANGUAGE SAMPLE

	Total Words	Number of Communication Units	Mean Length of Communication Unit	Subordination Index	Type Token Ratio	Developmental Sentence Score
Word Recognition Score	.168	.160	.135	.044	.205	.326
Word Definition Score	.460 x	.394 x	.366 x	.357	.211	.528 xx
Total Word Meaning Score	.416 x	.365 x	.332	.284	.249	.539 xx

x $p < .05$
xx $p < .01$

TABLE 8

The scores on the word definition task score are correlated significantly ($p<0.05$) with the tallies for three of the syntactic features of the language sample: total words, number of communication units and mean length of communication unit. There are no significant correlations between the word recognition scores and any of the selected features measured. The total word meaning score is related ($p<.05$) to the total words and the number of communication units.

It may also be noted that the Developmental Sentence Score is very significantly related to both the word meaning definition score and the total word meaning score.

The relationship between the Developmental Sentence Score and features of the language samples is shown in Table 9. The scores of the DSS were found to correlate very significantly ($p<.01$) with all features selected from the language sample, except type-token ratio and even here the correlation was significant at the .05 level.

CORRELATIONS BETWEEN DEVELOPMENTAL SENTENCE SCORE AND INCIDENCE OF SELECTED FEATURES OF THE LANGUAGE SAMPLE

	DSS
Total Words	.744 xx
Number of Communication Units	.542 xx
Mean Length of Communication Unit	.657 xx
Subordination Index	.702 xx
Type Token Ratio	.414 x

x $p < .05$
xx $p < .01$

TABLE 9

The Developmental Sentence Score procedure, designed as a clinical instrument, was predicated on the notion of the predictable emergence of particular features in the language of normal children. It is worth noting that, in this study, the children's scores on this measure were correlated so significantly with other measures developed by researchers who were interested primarily in descriptive analyses.

Correlations Between Word Order Task Scores and Incidence of Selected Features of the Language Sample and the Developmental Sentence Score

Correlations between the word order task scores and the occurrence of particular features in the language sample were tabulated and are presented in Table 10.

CORRELATIONS BETWEEN WORD ORDER TASK SCORES
AND INCIDENCE OF SELECTED FEATURES OF THE LANGUAGE SAMPLE

	Total Words	Number of Communication Units	Mean Length of Communication Unit	Subordination Index	Type Token Ratio	Developmental Sentence Score
Word Order Comprehension Task Scores	.403 x	.329	.356	.359	.048	.396 x
Word Order Production Task Scores	.389 x	.347	.333	.222	.000	.448 x
Total Word Order Scores	.427 x	.374 x	.367 x	.287	.014	.458 x

x $p < .05$
xx $p < .01$

TABLE 10

The total number of words, which in itself is significantly correlated with the mean length of communication units, also correlated with all the word order measurements at the 0.05 level of significance. The actual number of communication units and the mean length of communication units were correlated only with the total word order score. No other significant correlations were noted between the word order scores and the selected features noted in the language sample. The Developmental Sentence Score, however, was seen to correlate positively with all measures of word order control. As reported above, the DSS also correlated significantly with the selected features of the language sample (see Table 9).

In summary, the three word order measures were consistently related ($p<0.05$) to only one measure of the language sample--total words spoken.

3. SUMMARY OF THE FINDINGS

Table 11 presents a summary of the significant relationships found among the data.

SUMMARY OF THE FINDINGS

	W O Comp Score	W O Prod Score	Total W O Score	W Recog Score	W Def Score	Total W Mgn Score	Total Words	No of CU	MLCU	Sub Index	TTR	DSS
W O Comp Score		xx	xx	-	-	-	x	-	-	-	-	x
W O Prod Score			xx	x	xx	xx	x	-	-	-	-	x
Total W O Score				x	xx	xx	x	x	x	-	-	x
W Recog Score					x	xx	-	-	-	-	-	-
W Def Score						xx	x	x	x	-	-	xx
Total W Mgn Score							x	x	-	-	-	xx
Total Words								xx	xx	xx	-	xx
No of CU									-	xx	-	xx
MLCU										xx	-	xx
Sub Index											-	xx
Type Token Ratio												x
DSS												

x $p < .05$
xx $p < .01$

TABLE 11

A general relationship between syntactic and semantic growth can be noted. This relationship is most evident in the high correlation ($p<.01$) between the total word meaning score and the total word order score. The total word order score is also correlated with the word meaning definition score ($p<.01$) and the word meaning recognition score ($p<.05$). The total word meaning score is correlated with the word order production score.

However, such a global relationship may not be true for all the components of syntactic and semantic growth which were considered. For example, the word order comprehension scores are not related to any of the word meaning scores. Similarly, the word meaning recognition scores are less significantly related, than the definition scores, to the word order scores.

Total test scores of the children's control of word order were related ($p<.05$) to some features of their language in connected discourse: the total word count, the number of communication units and the mean length of utterance. Considered individually, the word order comprehension and production scores were related only to the total word count ($p<.05$).

The total word meaning test scores were also related ($p<.05$) to some features of the language samples: the total word count and the number of communication units. However, the word definition scores, themselves, were related ($p<.05$) to the total word count, the number of communication units and the mean length of utterance. The word meaning recognition score was not related to any of the features of the language sample.

The Developmental Sentence Score was significantly ($p<.01$) related to the word meaning definition score, the total word meaning score, the total number of words in a sample, the number of communication units, the mean length of utterance, and the subordination index. It was less significantly related ($p<.05$) to the word meaning definition scores and all the word order scores.

The total word count was significantly related ($p<.01$) to all other features of the language sample except the type-token ratio. It was also related ($p<.05$) to all measures of word meaning and word order except the word meaning recognition score.

The word meaning recognition score was unique in that it was unrelated to any other variable except the word meaning definition score ($p<.05$) and the total word meaning score; it was not related to any word order scores or to any of the features of the samples. Among the latter, the type-token ratio was related only to the Developmental Sentence Score ($p<.05$).

4. SUMMARY

This chapter has presented the results of the analysis of the data for this study into selected aspects of child language. Correlations among the various measures were given and the most significant relationships were noted.

Chapter V

SUMMARY, CONCLUSIONS AND IMPLICATIONS

The aim of this investigation was to determine the nature of the relationship between children's semantic and syntactic development.

Thirty five-year-old boys and girls participated in the study. Each was tested on measures of word meaning recognition and definition and word order control in both comprehension and production tasks. A language sample was also elicited from each child.

Each of the tests was scored and the language sample was analyzed for the incidences of five selected features. A Developmental Sentence Score was also determined for each language sample.

Means and standard deviations were tabulated for each of the above variables; correlations were computed, and t-tests run to determine the significance of each correlation.

In the following sections, a summary of the findings of the statistical analysis is presented, together with a discussion and the implications of these findings.

1. SUMMARY OF FINDINGS

1. There was a generally positive relationship between semantic and syntactic growth. The total word meaning score was highly correlated ($p<.01$) with the total word order score.

2. There were many more significant correlations between expressive language scores and other variables measured than between receptive language scores and other measures. The word order comprehension scores were not related to any of the word meaning scores; the word meaning recognition score is related only to the word order production score.

3. Control of word order was related ($p<.05$) to certain features of the language sample: the total word count, the number of communication units and the mean length of utterance. The individual word order comprehension and production scores were related ($p<.05$) only to the total word count.

4. The total word meaning scores were related to the total number of words, and of communication units produced in the samples ($p<.05$). The word order definition scores were also related to the total number of words and units, and to the mean length of utterance ($p<.05$). The word meaning comprehension scores were unrelated to any of the sample features.

5. The Developmental Sentence Score and the total word count emerged as good summary scores. Both were related to all other scores except the word meaning recognition score; the total number of words in a sample was also unrelated to the type-token ratio.

6. The word meaning recognition score and the type-token ratio were almost completely unrelated to other aspects of language measured. The former was related only to other word meaning scores, and the type-token ratio, only to the Developmental Sentence Score.

2. DISCUSSION OF THE FINDINGS

The findings provide an answer to the central research question underlying this study: there was a general, but incomplete, relationship between the children's understanding of word meaning and their ability to comprehend and produce sentences. Some of the results of correlations between certain components of the study, however, warrant elaboration and discussion.

The Test Scores

It can be noted among the actual test scores that there is a high correlation between the scores on the comprehension and production portions of the word order tests, but none at all between the scores on corresponding portions of the word meaning tests, that is, between the word meaning recognition and definition tests. A possible explanation of this difference is that the word order comprehension and production tests are, in fact, measuring a single development, control of word order, whereas the word meaning tests assess two more disparate abilities: the conceptual knowledge of a referent, and the conceptual and verbal skills required to give a definition. Another reason for the difference may be the variation in the stimuli used in each test. The stimulus for both word order tests was a series, similar, but not identical, of pictures and spoken simple sentences. The stimulus for the word meaning recognition test was a group of pictures and a spoken word; for the word meaning

definition test, only a spoken word was given. Presumably, these different stimuli for the word meaning tests made significantly different psychological and linguistic demands upon the children.

More difficult to interpret is the lack of agreement between the word order and word meaning comprehension scores. The principal reason may lie in the limited power of the word order comprehension test to have discriminated sensitively enough among the subjects' capabilities. Another reservation about the word order comprehension test involves the forced choice procedure which allows the child, regardless of his ability, a fifty per cent chance of success on each item.

On the other hand, the children's language production on both the word order and the word meaning tests was very significantly related. This agreement, however, may reflect a relationship among variables other than the control of word order and the ability to compose definitions. Important variables besides linguistic competence influence language performance, e.g. the child's personality, sociability and motivation. Presumably, these factors were fairly constant during both tests, and they may account, more significantly than the variables being measured, for the high degree of congruence between the test production scores.

The results of many of the correlations drawn between components of the word order and word meaning tests would suggest that other psychological and linguistic variables may have

strongly influenced the findings, or that the tests themselves were unable to measure accurately the variables under study.

The Language Sample

Among the syntactic measures taken of the language sample there is a strong relationship. In particular, it would appear from these results that fluency (total words) and complexity (as measured by the subordination index and the Developmental Sentence Score) are very significantly related.

Conversely, the type-token ratio, a vocabulary measure, was not correlated with any syntactic measure of the sample. This result was undoubtedly a function of the sampling situation. As identical stimuli were used for all children, the variety of vocabulary used was restricted, in large part, by the actual tasks and materials presented to the children. It would be inaccurate to assume, therefore, that expressive vocabulary is totally unrelated to syntactic maturity; more likely, the type-token ratio was too feeble an instrument to tap the semantic competence of the children.

Correlations Between Test Scores and Sample Features

The word order test scores were only marginally related to the syntactic measures taken of the language samples. This rather surprising discrepancy may be attributable to the uncertain validity of the word order tests or to the variable response of the children to the structured testing procedures and to the more casual sampling situation.

Of much more significance were the relationships between the word meaning scores and the features of the language sample. The word meaning recognition scores were unrelated to any syntactic measure of connected discourse, including the Developmental Sentence Score. The absence of any significant relationship indicates that there was little, if any, relationship between the children's receptive vocabularies and their observable linguistic performances.

The word meaning definition score, however, was related to all the syntactic features of the language sample, including the Developmental Sentence Score, except the subordination index. Evidently, the child's ability to use the definitional form to encode his knowledge about objects and activities was closely related to a demonstration of his syntactic skills. This is perhaps the most interesting of the results of the correlations found among the scores.

3. METHODOLOGICAL CONSIDERATIONS

The difficulties inherent in isolating, defining and testing discrete aspects of language competence became glaring during the course of this study. A discussion of the results raises serious methodological questions about the testing and sampling procedures used.

1. When a child is asked to respond to a picture as a portrayable correlate of a syntactic structure, it is extremely problematic to separate the linguistic from the non-linguistic

demands of the task. It was impossible to determine with certainty to what degree he is drawing upon his knowledge of word order to give his answer. For example, to illustrate the sentence, "The boy with the ball called to the girl," the following picture was shown.

The word "called" is represented by the boy's open mouth and two straight, radiating lines. To comprehend the sentence the child needed to be able to interpret this clue, which is really a convention of print. Perhaps, he would consider it more likely that the girl would be calling "Throw it" and would respond to this prediction more immediately than to the word

order in the spoken sentence.

2. It may be impractical, if not impossible, to attempt to theorize about the distinction between "semantics" and "syntax." The simple reversal of subject and object within a sentence appears to be a syntactic change; on the other hand it could also be considered (especially with a picture cue) to be a matter of semantics; for the child must determine which word then is the agent (or actor) and which the acted upon. Certainly, knowledge of the referential properties of the actual words used in the sentence is needed to enable him to make such distinctions.

3. In assessments of children's language expression it may be invalid to consider only the semantic and syntactic features of the language. Pragmatic and contextual variables, as well as underlying linguistic competence, obviously influence language performance, and should be taken into account.

The major finding of this study was a general, but inconsistent relationship, between the child's understanding of word meaning and his ability to produce and comprehend sentences. These results, however, must be considered with reservations about the basic assumption of the study, that syntactic and semantic growth can be viewed discretely, and with even more severe reservations about the validity of the instruments designed for the present study.

4. IMPLICATIONS

The purpose of this study was to explore the nature of children's language rather than to outline or prove particular teaching strategies for language development. Nonetheless, some tentative implications for teachers may be found in the results.

The fact that fluency was so closely related to measures of word meaning and syntactic complexity would suggest that language expression, itself, in both oral and written modes, facilitates the development of both vocabulary and mature sentence structure.

The results support the basic notion that semantic and syntactic development is closely associated. Presumably, the most effective instructional plans do not separate "vocabulary" and "grammar," but integrate non-linguistic experiences, especially valuable in expanding word meanings, with the linguistic, or literary, experiences in the classroom.

The discrepancies between the results of the tests and the measures taken of the language sample convey a cautionary note to teachers against the exclusive use of tests to evaluate children's language. Even brief, periodic samples could provide valuable information about the students' language growth.

5. IMPLICATIONS FOR FUTURE RESEARCH

Further research is needed to develop richer and more sensitive instruments to tap the various aspects of language competence. Clever ways are needed to probe the component skills of language users.

Longitudinal studies which investigate the correlations among the variables at different ages would be helpful in determining the nature of the progressive stages of development.

Comprehensive language evaluations which look at children's language skills in a variety of situations, with different audiences, may provide insight into all the linguistic and non-linguistic variables involved in language use.

The strong positive relationship between the ability to define words and syntactic control, and the equally insistent negative correlation between word recognition and syntactic control, warrant further investigation.

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Appendix A

Words Used for Word Meaning Definition Test

car	teacher
cow	building
baby	arrow
girl	kangaroo
ball	accident
block	nest
clown	caboose
key	envelope
can	picking
chicken	badge
blowing	goggles
fan	peacock
digging	queen
skirt	coach
catching	whip
drum	net
leaf	freckle
tying	eagle
fence	twist
bat	shining
bee	dial
bush	yawning
pouring	tumble
sewing	signal
wiener	capsule

Appendix B

Stimulus Sentences for Comprehension Test

	Contrast Tested	Items Used
1.	subject/object, active voice	a) The boy follows the dog. b) The ball hits the boy.
2.	subject/object, active voice, inverted word order	a) Pushing the girl was the boy. b) Hugging the child was the woman.
3.	subject/object, simple passive	a) The car was pulled by the tractor. b) The train was hit by the truck.
4.	subject/object, passive voice, modified	a) The boy on the bicycle is followed by the car. b) The boy is awakened by the child in bed.
5.	direct/indirect object	a) The girl shows her mother her friend. b) The man gives the dog a monkey.
6.	reversal of terms as subject/indirect object in sentence which contains noun clause as direct object	a) The boy tells the girl which flower to pick. b) The girl tells the boy what to paint.
7.	reversal of terms as direct object and object of modifying adverbial phrase	a) The boy brings the cat to the mouse. b) The mother takes the cat from the baby.
8.	adverbial modification	a) When the boy called, his mother came.
9.	adjective modifiers	a) The soldier with the gun stopped the robber. b) The boy is eating the cookies which are on the table.
10.	prepositional phrases--reversal of terms in the object slots of two phrases	a) From the tree, the dog goes to the house. b) From the car, the man

Appendix C

Criteria for Scoring Items on the Syntax Production Test

Number	Contrast tested	Items used	Minimal requirement
1	subject-object, active voice	a) The dog pulls the man/ The man pulls the dog b) The child frightened the man/ The man frightened the child	$N_1 + V_1$ active + N_2/ $N_2 + V_1$ active + N_1
2	subject-object, inverted word order, active voice	a) Chasing the dog was the cat/ Chasing the cat was the dog b) Leading the woman was the child/ Leading the child was the woman	participle + N_1 + auxiliary + N_2/ participle + N_2 + auxiliary + N_1
3	subject-object, passive voice	a) The boy was found by the dog/ The dog was found by the boy b) The boy was chased by the cat/ The cat was chased by the boy	N_1 + V + d + by + N_2/ N_2 + V + d + by + N_1
4	subject-object, passive voice, with modification	a) The big dog is led by the boy on skiies/ The boy on skiies is led by the big dog b) The woman in the old chair is rocked by the boy/ The boy is rocked by the woman in the old chair	N_1 + V + d + by + N_2/ N_2 + V + d + by + N_1

Appendix C
(continued)

Number	Contrast tested	Items used	Minimal requirement
5	Direct-indirect object	a) The mother shows the little girl her kitty/ The mother shows her kitty the little girl	$N_1 + V + N_2 + N_3$/ $N_1 + V + N_3 + N_2$
		b) The man shows the cat the dog/ The man shows the dog the cat	
6	Reversal of subject/ indirect object in sentence which contains noun clause as direct object	a) The boy tells the girl which juice to drink/ The girl tells the boy which juice to drink	$N_1 + V_1 + N_2$ (which cl)/ $N_2 + V_1 + N_1$ (which cl)
		b) The boy tells the girl which chair to sit on/ The girl tells the boy which chair to sit on	
7	Reversal of direct object and object of modifying adverbial phrase	a) The man brings the boy to his mother/ The man brings the mother to the little boy	$N_1 + V_1 + N_2 + (\text{to } N_3)$ $N_1 + V_1 + N_3 + (\text{to } N_2)$
		b) The little boy brings the mother to the little girl/ The little boy brings the little girl to the mother	

Appendix C
(continued)

Number	Contrast tested	Items used	Minimal requirement
8	Subject of main clause/ subject of adverb clause	a) When the child arrived, the man waved/ When the man arrived, the child waved	(When $N_1 + V_1$) $N_2 + V_2 \rightarrow$ (When $N_2 + V_1$) $N_1 + V_2$
9	Adjectival modification of subject/ of verb	a) The boy who is holding the ball called to the girl/ The boy called to the girl who is holding the ball	N_1 + (who + V_1 + N_2) + V_2 to + N_3/ $N_1 + V_2$ to N_3 + (who + $V_1 + N_2$)
		b) The boy on the bicycle followed the girl/ The boy followed the girl on the bicycle	N_1 + (on + N_2) $V_1 + N_3 \rightarrow$ $N_1 + V_1 + N_3$ + (on + N_2)
10	Reversal of terms in object slots of two prepositional phrases	a) From the window, the lady goes to the door/ From the door the lady goes to the window	(From + N_1) $N_2 + V_1$ (to + N_3)/ (From + N_3) $N_2 + V_1$ (to + N_1)
		b) From the car the lady walked to the store/ From the store the lady walked to the car	

Appendix D

Samples from Children's Definitions

Descriptive definitions:

cow - moo-oo
- lives in a barn
- he jiggles his bell

sewing - sewing the shirt
- needle

Functional definitions:

cow - she gives milk
- cow means milk and some farmer

sewing - that's when you sew something 'cause there's a hole
- that's making clothes

Categorical definitions:

cow - it's an animal that gives us milk
- it's an animal and it gets milk from grass and squeezes the milk out and the milk comes into a jar

sewing - mending
- you stitch

Appendix E

Developmental Sentence Scoring

Score	Indefinite Pronouns or Noun Modifiers
1	it, this, that
2	no, some, more, all, lot(s), one(s), two (etc.), other(s), another
3	something, somebody, someone
4	nothing, nobody, no one, none
5	any, anything, anybody, anyone, every, everyone, everything, everybody
6	both, few, many, each, several, most, least, much, next, first, last, second (etc.)

	Personal Pronouns
1	1st and 2nd person: I, me, my, mine, you, your(s)
2	Third person: he, him, his, she, her, hers
3	Plural pronouns: we, us, our(s), they, them, their
4	those, these
5	Reflexive pronouns: myself, yourself, himself, herself, itself, themselves
6	Wh-pronouns: who, which, whose, whom, that, what, how many, how much: I know <u>who</u> came. That's <u>what</u> I said. Wh-word + infinitive: I know <u>what</u> to do.
7	(his) own, one, oneself, whichever, whoever, whatever: Each has <u>his own</u>. Take <u>whatever</u> you like.

Score	Main Verbs
1	Uninflected verb: I see you.
	Copula, is or 's: It's red.
2	is + verb + ing: He is coming.
3	-s and -ed: plays, played
	Irregular past: ate, saw
	Copula am, are, was, were: I am good. You're good.
	Auxiliary am, are, was, were: I was going. We were going.
4	can, will, may + verb: may go
	Obligatory do + verb: Don't go.
	Emphatic do + verb: I do see.
5	could, would, should, or might + verb: might come, could be
	Obligatory does, did + verb
	Emphatic does, did + verb
6	must, shall + verb: must come
	have + verb + en: I've eaten.
	have ('ve) got: I've got it.
7	Passive, any tense.
8	have been + verb + ing
	had been + verb + ing
	modal + have + verb + en: may have eaten

Score

modal + be + verb + ing:
could be playing

Other auxiliary combinations:
should have been sleeping

Secondary Verbs

1 Five early-developing infinitival complements:
I wanna see (want to see).
I'm gonna see (going to see).
I've gotta see (got to see).
Lemme [to] see (let me [to] see).
Let's [to] play (let [us to] play).

2 Noncomplementing infinitives:
I stopped to play.
I'm afraid to look.

3 Participle, present or past:
I see a boy running.
I found the toy broken.

4 Early infinitival complements with differing subjects in kernels:
I want you to come.
Let him [to] see.

Later infinitival complements:
I had to go. I told him to go.
I tried to go. I asked you to go.

Obligatory deletions:
Make it [to] go.
I'd better [to] go.

Infinitive with wh-word:
I know what to get.
I know how to do it.

5 Passive infinitival complement:
I have to get dressed.
I want to be pulled.

6 Gerund:
Swinging is fun.
I like fishing.
He started laughing.

Score	Negatives
1	it, this, that + copula or auxiliary is, 's + not: It's not mine. This is not a dog. That is not moving.
2	can't, don't
3	isn't, won't
4	Any copula-negative or auxiliary-negative contractions, other than #1, 2, 3, or 5: They aren't here. I couldn't go. Any pronoun-auxiliary contraction + not, other than #1 or 5: You're not going. He's not here. I'm not sure. Any uncontracted negatives, other than #1 or 5: I can not go. I should not go.
5	Negatives with have: Uncontracted negative: I have not eaten it. Auxiliary have-negative contraction: I hadn't eaten it. Pronoun-auxiliary have contraction: I've not eaten it.

Score	Conjunctions
1	and
2	but
3	because
4	so, and so, so that, if
5	or, except, only
6	where, when, while, why, how, whether (or not), for, till, until, since, before, after, unless, as, as + adjective + as, as if, like, than, than: I know where you are. I see why you want it. Don't come till I call. Go before he sees you.

Score

Obligatory deletions (score 6):
I can run faster than you [can run].
I am as big as a man [is big].

Optional deletions (score 0):
She was hungry, that's why [she ate it].

Wh-words + infinitive:
I know how to do it.
I know where to go.

7 therefore, however, whenever, wherever, etc.

Interrogative Reversals

1 Reversal of copula:
Is it red?
Isn't it red?
Were they there?

2 Reversal of auxiliary be:
Is he coming?
Isn't he coming?

3 Obligatory do, does, did:
Do they run?
Does it bite?
Didn't it hurt?

Reversal of modal:
Can you play?
Won't they come?
Shall I sit down?

Tag question:
It is fun, isn't it?
It isn't fun, is it?
He has gone, hasn't he?
He hasn't gone, has he?

4 Reversal of auxiliary have:
Has he seen you?

Reversal with any two auxiliaries:
Has he been eating?
Can he be sleeping?
Couldn't he have gone?

5 Reversal with three auxiliaries:
Could he have been going?
Wouldn't he have been sleeping?

Score	WH-Questions
1	who, what, what + noun: What do you want? Who is there. What is coming? What book are you reading?
2	where, how many, how much, what . . . do, what . . . for: Where is he? How many do you want? How much do you want? What are you doing? What is a hammer for?
3	when, how, how + adjective: When shall I come? How do you do it? How big is it?
4	why, what if, how come, how about + gerund: Why are you crying? What if I won't do it? How come he is crying? How about coming with me?
5	whose, which, which + noun: Whose car is that? Which do you want? Which book do you want?